DIGITAL STRATEGY IN THE GLOBALIZATION OF MEDIUM SIZED INDIAN PHARMA COMPANIES - AN EMPIRICAL STUDY

A THESIS

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NOVEMBER 2017

Dedicated to

Indian Pharmaceutical Industry

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Date:

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"It is an opportunity to remember and acknowledge the contributions of the people who have been in the path of this journey called… LIFE"!

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ABSTRACT

DIGITAL STRATEGY IN THE GLOBALIZATION OF MEDIUM SIZED INDIAN PHARMA COMPANIES-AN EMPIRICAL STUDY

Global pharmaceutical industry is regarded as one of the most recognized sector because of its contribution to keep global population healthy and disease-free. Changes in regulatory, patent and market trends is expected to drive opportunities for generic drugs and thus ensuring greater opportunities for Indian pharmaceutical companies in global markets. Pharma industry is intense capital and technology driven industry because of intrinsic complexities like developmental challenges for new drugs, regulatory challenges for commercialization, huge capital requirement, longer gestation period, and delay in return on investments (ROI) and frequent changes in disease trends.

Globalization increases cross border transaction between various countries and has played a key role for principal pharmaceutical companies in India to achieve a higher feat mainly in three areas – developing state of the art processes for active ingredients, developing generic formulations and their commercialization in the global market. As globalization continues to have its powerful and positive impact, we try to ponder on opportunities that the Indian pharmaceutical industry could have, having seen its past track record in influencing global healthcare sector.

India rightly said to be the "pharmacy of the world" boosts of having the highest number of pharmaceutical manufacturing facilities and export of generic drugs globally. Since most companies operating in global markets are medium sized, it is very important to understand how these companies embrace globalization and technologies to shift quickly to development wave and exploit global markets cost effectively. In spite of pharma industry's success and growth, Indian pharma industry continues to face challenges globally in the area of innovation, quality issues, supply delays, marketing challenges, adoption of latest digital technologies and many more.

The objective of this qualitative research was to understand the importance of digital strategy for medium sized pharma companies to become successful in highly competitive, complex global markets. The research was carried out in practical environment by

interviewing different level professionals, leadership teams and few directors as well. Considering the study objectives span both qualitative and quantitative domains, mixed method approach design was used to collect, analyze and interpret the data. Research was done in two phases. In Phase I study was focused to understand the opinion on the need, capability to implement the digital strategy and in Phase II of the study was to focus on various motivations behind pursuing the digital strategy and the plausible outcomes that are desired by the companies willing to go for digital strategy. Findings from both primary and secondary research prove that digitalization and automation plays a very important role to expand the business of medium sized pharma companies globally.

The results of this research were quite promising. Small firms intending to use digital strategies to competitive advantage through speed in data management, Medium sized firms primarily want to use digital strategies for increasing manufacturing output and benchmark their product quality and regulatory compliance in line with global standards. Large-scale company's motives are at a different level, as they want to use digital tools for market penetration and creating brand equity for their company and brands.

Research findings clearly establishes that many of the large Indian pharma companies have grown over last three decades from humble beginning by adoption of market oriented strategies. Utilization of digital tools across the various functions helped them move to large category. It was further found in the current study that Medium and large size companies are very keen on adopting newer technologies and they are focus is on implementation of the strategies effectively.

In the current era driven by technology, no business can sustain and become successful without implementing latest digital technologies and automation. The integrated digital strategy is need of the hour for medium sized Indian pharma companies to sustain in domestic market and successfully capture global markets with all the complexity that it offers.

Key words: Global pharma industry, Digital strategy, Digitalization, Digital technologies in pharma, Digital marketing, Digitalization.

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LIST OF ABBREVIATIONS

SCM	Supply Chain Management
ERP	Enterprise Resource Planning
LMS	Learning Management System
QMS	Quality Management System
CRM	Customer Relationship Management
SAP	Systems Applications and Products
MSME	Micro, Small and Medium Enterprises
FDI	Foreign Direct Investment
SWOT	Strengths, Weakness, Opportunities, Threats
PESTLE	Political, Economic, Social, Technological, Ecological
GDP	Gross Domestic Product
USFDA	United States Food and Drug Administration
API	Active Pharmaceutical Ingredient
NCE	New Chemical Entity
NBE	New Biological Entity
MNC	Multi National Company
IMF	International Monetary Fund
BCE	Before Common Era
CAGR	Compounded Annual Growth Rate
ANDA	Abbreviated New Drug Application
WHO	World Health Organization
ROI	Return on Investment
GMP	Good Manufacturing Practice
GXP	Good X Practice (FDA compliance; X can mean: Clinical, Laboratory, Manufacturing, Pharmaceutical, etc.)
CAPA	Corrective And Preventive Actions
DMS	Document Management System
BA	Business Analytics
IOT	Internet of Things
AI	Artificial Intelligence
HIV	Human Immune Deficiency Virus
AIDS	Acquired Immune Deficiency Syndrome

LIST OF ABBREVIATIONS

WTO	World Trade Organization
TRIPS	Trade Related Aspects of Intellectual Property Rights
IDMA	Indian Drugs Manufacturers Association
SME	Small and Medium Enterprises
R&D	Research & Development
RoW	Rest of the World
BRICS-MT	Brazil, Russia, India, China, South Africa, Mexico, Turkey
CIS	Common Wealth of Independent States
EU	European Union
ANZ	Australia & New Zealand
EDL	Essential Drug List
Pharmexcil	Pharmaceuticals export promotion council of India
OTC	Over The Counter
Rx	Prescription Product
Gx	Generic Product
FY	Financial Year
APAC	Asia Pacific
LLC	Limited Liability Company
LTD.	Limited
DPCO	Drugs Price Control Order
M&A	Mergers & Acquisitions
Inc.	Incorporated
UK	United Kingdom
USA	United States of America
USD	United States Dollar
CRAMS	Contract Research & manufacturing Services
CRO	Contract Research Organization
Bn	Billion
Mn	Million
EPS	Earnings Per Share
MSD	Merck, Sharp and Dohme

LIST OF ABBREVIATIONS

SKB	Smith, Kline and Beecham
J&J	Janssen & Janssen
UX	User Experience
ICT	Information and Communication Technology
ADS	Automated Decision Support systems
PLC	Programmable Logical Control Systems
BI	Business Intelligence

CHAPTER I

INTRODUCTION

1. 1 Globalization

1.1.1 Background

Globalization is the process of becoming global and every aspect of social reality is undergoing globalization, as witnessed by the emergence of world economy, cosmopolitan culture and international social movements (Albrow, Martin & Elizabeth King, 1990). The word "globalization" established its current meaning in the 1970s, which "emerged from the intersection of four interrelated sets of 'communities of practice': academics, journalists, publishers or editors, and librarians". The International Monetary Fund (IMF Annual Report, 2000) identified four fundamental aspects of globalization: trade and transactions, capital and investment movements, migration and movement of people, and the dissemination of knowledge.

Globalization is sometimes used to explain the recent integration of domestic economies, industries, cultures and government policies around the world. This integration would have occurred through increase in the technological capabilities and efficiency of world trade, communication and transportation as highlighted by (Wolf & Martin, 2014). Although, opinions on the origins of globalization vary, largescale globalization began in the 19th century. During this and the next century, the connectivity of the global economies and cultures grew very quickly. Globalizing processes affect and are affected by business, corporates, economies, societies, cultural resources, and the natural environment. In the current digital era, globalization refers to the economic integration of the countries, regions and clusters in global markets, but it is also used to describe the socio-cultural integration due to the rise of the internet usage (Imagining the Internet, 2009).

1.1.2 Effect of globalization on international investments

Globalization has resulted in connectivity among markets and increased awareness and communication of various business opportunities worldwide. The technological advances have brought new global investment opportunities and information about new markets at the fingertips. The distance is not an issue anymore. Both potential risks and profit opportunities have become within easier reach, thanks to the latest technological developments across the globe.

Because of openness in global trade, companies have started getting the advantage of difference in pricing structures and exchange the labor and product supplies in different markets. The globalization potentially aids in protecting the economic health, newer acquisitions, revenues and profits through increased investments. The international investments is a chain reaction and globalization encourages more and more economies to increase international investments and opportunities (Wolf & Martin, 2014).

The globalization plays a pivotal role in cross border exchange of ideas, labor, and technology, higher investment opportunities thereby increasing per capita productivity, strengthening economies, self-sustainability, employment opportunities and empowering the new eco-system in a way to inflect GDP for a longer period (Stever, H. Guyford, 1972). It is absolutely essential for the policy makers or government bodies to visualize globalization as an opportunity and not a threat. This is because pro-globalization mindset attracts investment activity as a basis for social and economic change necessary to produce a modern industrialized economy. Pharma companies across the world have spread their operations to all continents to reap the benefits offered by globalization. Globalization has helped the world population to get access to quality, affordable healthcare products in their fight against most diseases and disorders. Aided by globalization, during the past two decades several Indian pharma companies have taken quantum leap on global markets and have been rightly rewarded with benefits of cross-border trade and accolades.

1.1.3 The controversy behind globalization

Many researchers and academicians opined and projected that globalization resulted in increase in standards of living in developing countries besides other benefits mentioned in the previous sections. Skeptics who do not believe in globalization, however, feel that it has disproportionately benefited the western companies from the west at the damage of developing economies, cultures, and people. While these views may be true, globalization is a great thing that could have ever happened to this world. These critics actively work to strengthen domestic economies at the expense of free trade (Frank & Andre Gunder,1998).

1.1.4 Globalization of health

Global health is defined as the health of populations in a global context that go beyond the views and challenges of individual nations. The global health is about worldwide improvement of health, identifying the healthcare challenges while working together cross leveraging the talent, skills, and techniques to devise unique solution to make healthcare affordable. Devising policies for future healthcare issues, reduction of disparities, and protection against global threats that disregard national borders are all part of global health. Healthcare policy makers across the world should work together towards making the world a healthier place to live. Applying these principles to mental health is known as Global Mental Health, an essential aspect for a country's population (Vikram Patel & Martin Prince, 1976-1977). In contrast to the earlier notion, where healthcare sector focused only on national issues, the modern world has come together through the developments that have happened across all verticals. Some of these include — medical technology, advanced therapies, latest diagnostics, Artificial Intelligence (AI) and Internet of Things (IoT). Many countries such as India, China, Malaysia, South Korea, Japan and others have adopted latest tools and technologies through globalization.

Some of the examples of the globalization of health in the recent years include:

- Acquisition and mobility of healthcare professionals: For instance, United Kingdom now actively recruits nurses from India, Philippines etc. The increase in number of private and foreign insurance companies provides access to health services

- Internet era has made the world very small place and both patients and healthcare providers can reach their target audience through e-commerce, social networking and other digital technologies seamlessly across the borders.
- Digital technologies enable patients to get part of their treatment through advanced diagnostics at their comfort in any part of the world.

As per World Health Statistics report (2014), since 1999 the impact of globalization and drug patent issues took a dramatic path in global industry. A very serious infectious disease known as HIV/AIDS (Human Immune Deficiency Virus/ Acquired Immune Deficiency Syndrome) paved path for the globalization of Pharmaceutical industry because the disease does not confine to any particular region. In spite of the challenges posed by global companies with respect to their product patents, Indian pharma companies efficiently managed the challenges to cater to millions of patients suffering from HIV/ AIDS. This is one of the great successes of globalization.

Approaches that were not considered suitable for public health domain some years ago are currently being justified due to their comprehensiveness and compliance. Analyzing globalization, patents, and drugs now requires not only close attention to the public health consequences of World Trade Organization (WTO) agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS), but also an in-depth study of the need of development of new drugs (Agrawal &Saibaba, 2001). There is a need to establish the commitment and assurance from the international policy makers and drug developers to guarantee the access of new drugs to combat the challenging diseases and disorders the world continues to face. It is very important for the global health providers to collaborate on a global platform for this noble cause. There has been a great effort by global pharma companies in this area but due to the high cost of branded drugs, majority of patient population in developing and underdeveloped countries do not have access to these drugs until they go off patent. (World Health Organization, 2014).

It is very interesting to mention here that the Indian pharma industry is in the forefront of development and manufacturing of high quality affordable generic drugs to cater to millions of patients across the world because of globalization.

1.2 Global Pharmaceutical Industry

1.2.1 Background

Global pharmaceutical industry is one of the highly acclaimed industriesowing to its contribution to keep the global population healthy by bringing down disease burden to the world. Pharma industry is intense capital and technology driven industry because of the intrinsic complexities like developmental challenges for new drugs, regulatory challenges for commercialization, huge capital requirement, longer gestation period, and delay in ROI (Return on Investment) and frequent changes in disease trends. However, industry has been contributing to both human and financial health of the world. All new medicines introduced in the market are result of lengthy, costly and risky research and development conducted by pharma companies. On an average it takes more than a decade of efforts for a new drug to hit the market. Typically, only one or two out of every 10000 substances synthesized in laboratories successfully pass all stages of development to become a marketable medicine. Hence, pharma industry has its inherited challenges compared to other industries.

As per IMS (2012), annual global spending on medicines reached nearly $1.5 trillion by 2016. Of this, emerging markets, biologics and generics contributed more to spending. In the developed markets such as the USA, EU and Japan, the health spending declined by 57% due to the expiry of patents which currently attained huge profits globally. In addition to this increased cost containment measures adopted by payers and slower increases in spending on branded products are some of the reasons for the diminution. Concurrently, the lower cost version of expensive biologic medicines/ biosimilars continued to be launched, though with pace of time, and accounted only for $4-6Bn, or 2%, of the $200-210Bn in spending on biologics. By 2016, net spending on medicines, after off invoice discounts and rebates, surpassed $1 trillion globally.

Top 10 global Pharmaceutical Companies mentioned in the Table 1.1 control over 30% of the global sales. These companies operate globally and invest heavily on research and development of new drugs.

Table 1.1 - Top 10 global pharma companies (Deloitte, 2016)

Name of the Company	Revenue (in Bn USD) 2015-16	Market share
Johnson & Johnson	74.3	7%
Novartis	49.6	4.7%
Pfizer	49.6	4.7%
Roche	47.7	4.5
Merck	42.2	4%
Sanofi	41.2	3.9%
Glaxo Smith Kline	35.8	3.4%
Astra Zeneca	24.7	2.35%
Abbott Laboratories	20.2	1.95%
Amgen	20.1	1.95%

The revenue of the top companies is driven by their leading products from various therapeutic categories as mentioned in Table 1.2. It is observed that these products are grown phenomenally in last few years and they remain in Top 10 brands for some time.

Table 1. 2 –Top 10 global pharma products (Evaluate Pharma, 2015)

Name of the Molecule	Manufacturer	Brand Name	2015 Sales (Bn USD)
Adalimumab	AbbVie	Humira	11.00
Infliximab	J & J	Remicade	8.9
Rituximab	Roche	MabThera	8.6
Salmeterol	GSK	Seretide	8.2
Insulin Glargine	Sanofi	Lantus	7.6
Bevacizumab	Roche	Avastin	6.7
Trastuzumab	Roche	Herceptin	6.6
Rosuvastatin	AstraZeneca	Crestor	5.6

1.2.2 Classification of pharma industry based on regulation

As per IMS 2012, global pharma industry is classified based on the regulatory pathway and business economics.

1. **Regulated markets:** Below mentioned countries have stringent regulatory guidelines and entry barriers. Entering these countries would require world-class manufacturing facilities, product technology, quality systems, regulatory expertise along with huge investments
    - USA
    - Canada
    - European Union
    - Australia
    - Japan

The Indian pharmaceutical companies could explore and capitalize through numerous opportunities bestowed on them as a result of the changing dynamics of the global pharma industry especially that of the USA and Europe. Japan, the world's third largest and one of the most regulated pharma markets globally, is emerging as the new attractive destination for Indian drug companies. As a result of these, majority of Indian pharmaceutical companies are focusing on exports to high value-high risk regulated export markets of the USA and Europe.

2. **Semi-regulated markets:** In spite of the classification, some of the countries in this group have been moving towards stringent regulations to register pharma products in these countries. However, majority of the countries offer early commercialization opportunities as there are very few local manufacturers with a huge demand for imported drugs.
    - ASEAN region
    - Russia & CIS
    - Middle East & Africa
    - Latin America

With an objective to help more than 10,000 small pharmaceutical manufacturers embrace the wave of globalization, the Indian Drugs Manufacturers Association (IDMA) and the Pharmaceutical Export Promotion Council (Pharmexcil) have jointly planned to encourage these as 'focus markets'. The flexibility in rules and mandates from government further

qualifies Small and Medium scale enterprises (SMEs) for export approval in many semi-regulated countries. (PWC, 2012) This is an opportunity for Indian companies to tap the potential in these markets. Pharma industry has its own way of grouping the region based on the business economy and future prospects as illustrated in Figure 1.1.

Classification based on business economics and geography:

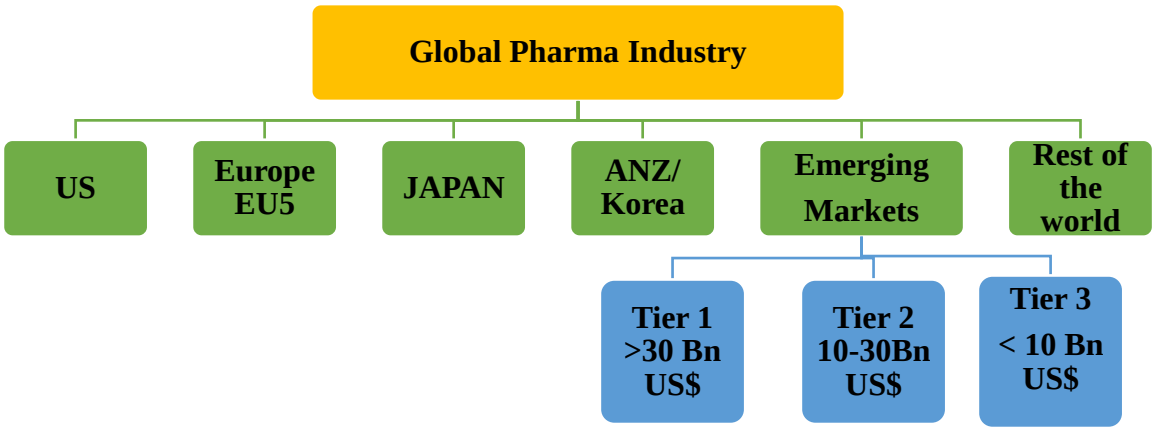

Figure 1.1 - Classification of global pharma industry (Source IMS, 2014)

1.2.3 Pharmaceutical market overview by region

a) Pharmaceutical industry in the United States of America

United States, the world's largest market for pharmaceuticals also happens to be the world leader in biopharmaceutical research. Data from IMS 2012, the biopharmaceutical industry of USA provides employment to more than 810,000 people. The industry supports nearly 3.4 million jobs across the U.S. economy either directly through the biopharmaceutical companies or through the connected network. The inevitable transformation across all segments of the U.S. healthcare industry will recast the pharmaceutical industry landscape (IMS, 2012).

b) Pharmaceutical industry in Europe

With public debt ratios at all-time highs, many developed countries have instituted strict measures and budget cuts thereby resulting in increased pricing pressures and restricted market access for pharmaceutical products. Two of the top three European economies, the

United Kingdom and Germany have put an end to free pricing for innovative drugs. The research-based pharmaceutical industry can play a critical role in restoring Europe to growth and ensuring future competitiveness in an advancing global economy. With more than 690,000 working people, it generates three to four times more employment indirectly – upstream and downstream – than it does directly. Despite this, it faces some challenges – regulatory hurdles, escalating R&D costs, in addition to fiscal austerity measures introduced by governments across most of Europe.

As per data from IMS, 2012, the world pharmaceutical sales in North America were 41% compared to 27.4% for Europe. While, the U.S. A is clearly the most important export destination, the EU exports significant amounts to other countries, including many of the emerging countries that experience high growth in pharmaceutical sales. European Union offers huge opportunities for affordable generics from India due to prevailing economic crisis, cost containment in purchasing and increase in healthcare burden due to ageing population and lifestyle disorders.

c) Pharmaceutical industry in Japan

Japan's pharmaceutical market is the second largest in the world just after US, representing 9.7% of the world pharma market in 2013. During the last several years, Japan's larger pharmaceutical companies have been setting up R&D sites globally. Japan government's biennial drug price reduction initiatives to help relieve high societal costs of delivering adequate healthcare curtail domestic growth opportunities. Traditionally, the international companies struggled to adapt to Japan's regulatory system and working culture. However, most major pharmaceutical companies maintain a successful presence in Japan despite several setbacks. Acquisitions have played crucial role for Indian pharmaceutical companies to venture into Japan.

d) Pharmaceutical industry in emerging markets

Regulated and developed markets focused on innovation and contribute to high share of global pharma revenues. Due to the global economic slowdown the growth of markets is flat in recent years. However, emerging markets from the developing countries like India, China etc. innovated the technology to develop the affordable generic drugs and these

markets continue to grow due to the high population, robust economy, disposable incomes etc. Rest of the world countries continue to grow compare to the developed countries. Comparative graph in Figure 1.2 illustrates how the emerging markets increase the share from 10% in 2006 to 30% in 2016 compare to the Rest of the world countries. (Matthias Buente, Stephan Danner et al, 2013)

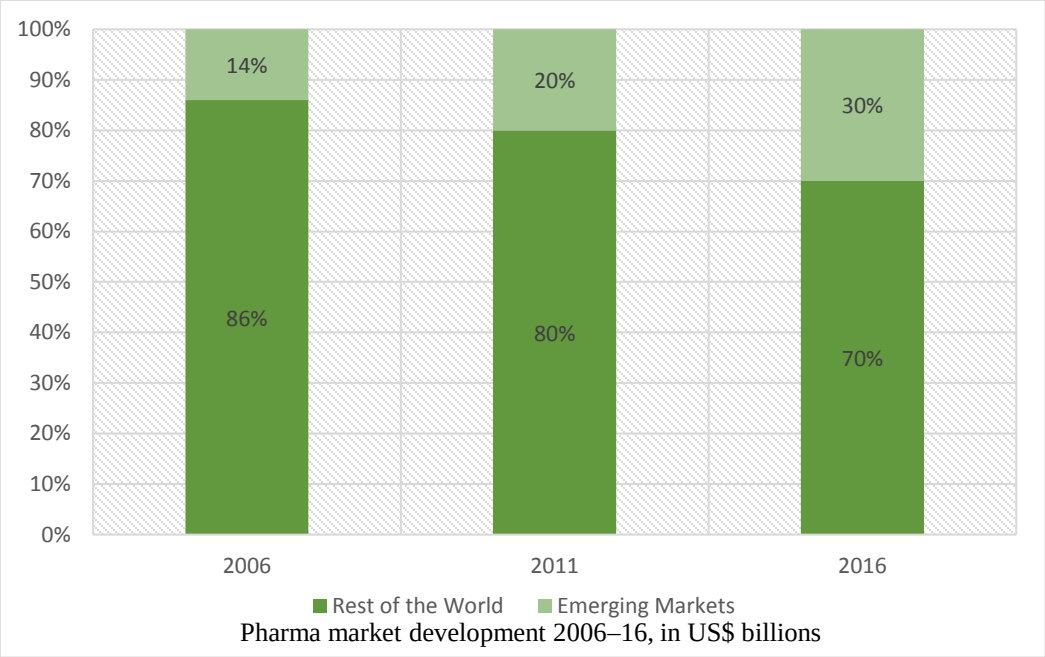

Figure 1.2 – Growth comparison of emerging and RoW market (Matthias Buente, Stephan Danner et al, 2013)

Tier 1 - China: With a compounded annual growth rate (CAGR) forecast of 16.7% between 2012 and 2017, China is considered to be one of the world's fastest growing pharma markets. The second largest pharmaceutical market in the world, China forecasted to grow from 108 Bn$ in 2015 to 167 Bn$ by 2020 with an annual growth rate of 9.1%. The rise of per capita income, ageing population, greater access to health care and country health care regulations will give a scope for china market to grow against the top most US pharma market (International Trade Administration, 2016).

Despite the recent Essential Drug List (EDL) revision and associated policies, the growth in China was primarily driven by additional investment from Chinese government and rising affluence of patients paying out-of pocket for premium products. The government's

plan of implementing four year plan (2012 to 2015) for the prevention and control of chronic diseases resulted in bulk healthcare spending.

Tier 2 – Brazil: Despite a slowdown in economic growth, pricing pressures and government cost containment measures, mushrooming of private healthcare and consumer medicines, the augmentation of public healthcare provision would continue to drive a forecasted growth of CAGR of 12.7% between 2012 and 2017.

Due to legislative changes, the foreign investments have been compounded exponentially into Brazilian health market and it led to increased external funding in the economy. In January 2015, the Brazilian government began enforcing the revised Brazilian Health Sector Law. This law was an amendment to the earlier Brazilian Federal Law and gave scope for foreign investments, acquisition of control in the aspect of health sector. The promising improvements led to investments in hospitals, clinics, laboratories etc (International Trade Administration, 2016).

Tier 2 –India: India had forecasted a CAGR growth of 12.5% between 2012 and 2017. It is believed that the health insurance in India reached to almost 50% of the Indian population. This was achieved mainly because of broadening basic healthcare provision to families living below the poverty line. The advances in the urban middle class private healthcare plans also expanded further. Because of these improvements, the healthcare system in India saw a significant growth (Gautam Kurana, 2015).

Tier 2 – Russia: Due to de-valuation of currency, decreasing purchasing power of people and economic slowdown, the Russian Pharmaceutical Industry has been spiraling down. Although, the Russian economy has seen economic disruption however foreign companies focus on Russian Pharmaceutical Industry (Deloitte, 2015)

Tier 3 Markets: The 17 Tier 3 markets represent a wide array of income levels, growth rates and healthcare sophistication. In a study, the tier 3 countries were classified into two groups based on average pharmaceutical spend per capita. Group 1 consisted of countries with sales >$85 per capita and included Poland, Argentina, Turkey, Mexico, Venezuela, Romania, Saudi Arabia, and Colombia. It was postulated that these eight countries grew at 9% CAGR in 2012-2017 reaching a combined market size of $82bn in 2017. The group 2

comprised of countries with sales below $85 per capita – Vietnam, South Africa, Algeria, Thailand, Indonesia, Egypt, Pakistan, Nigeria and Ukraine. As per the IMS forecast, these countries would grow at 11% CAGR reaching a combined market value of $45bn in 2017. (IMS Health, 2013)

1.2.4 Future of global pharmaceutical industry

Annual global spending allowed the growth of pharmaceutical industry from $30Bn in 2012 to $70Bn in 2016. This growth was fueled by volume growth in pharma emerging markets and higher spending by developed nations. Similarly, pharmaceuticals in the emerging countries doubled their expenses mainly due to increase in per capita spending as highlighted in Figure 1.3 (IMS, 2012).

With the change in disease trends, latest technologies in diagnosis, increased average life of human, increase in health conscious, implementing healthcare programs by the governments, access to newer drugs, the future of global pharma industry is bright. The growth in developing countries is horizontal due to the prevailing healthcare challenges, emerging markets continue to grow phenomenally (IMS institute for Health Informatics, 2012).

Reasons for growth of Pharma emerging markets

Two main factors that would drive high affordability of medicines include rising incomes and continued low cost for medicines. The pharma companies in the emerging countries were expected to double their spending thereby adding nearly $150-165Bn by 2016. Despite the fact that generic and other products account for approx. 83% of increase, patients face substantial out-of-pocket costs in these markets, with a few exceptions. This results in a limited usage of brands and expensive newer medicines. As per the IMS forecast, government supported or funded programs would drive the access to medicines allowing greater use of medicines. (IMS Health, 2013).

With more than 33% of global pharmaceutical market share, the emerging markets have long been regarded as the “promised land” for the pharmaceutical industry. Huge

populations, increasing prosperity, and improving longevity (albeit at differing rates) are considered as promising markets for companies suffering from the stagnation of mature markets, patent expirations, and increased regulatory hurdles. The pharmaceuticals of the emerging market would thus play a pivotal role in the sustainable growth of the industry. Emerging markets will increase in general significance and the BRICS has been expanded to BRICS-MIT with Mexico, Indonesia, and Turkey considering the population density, increase in healthcare awareness and rise in per capita spending on healthcare. Investment in local research, local development, and local manufacturing are considered to be the most effective levers for commercial success in these regions.

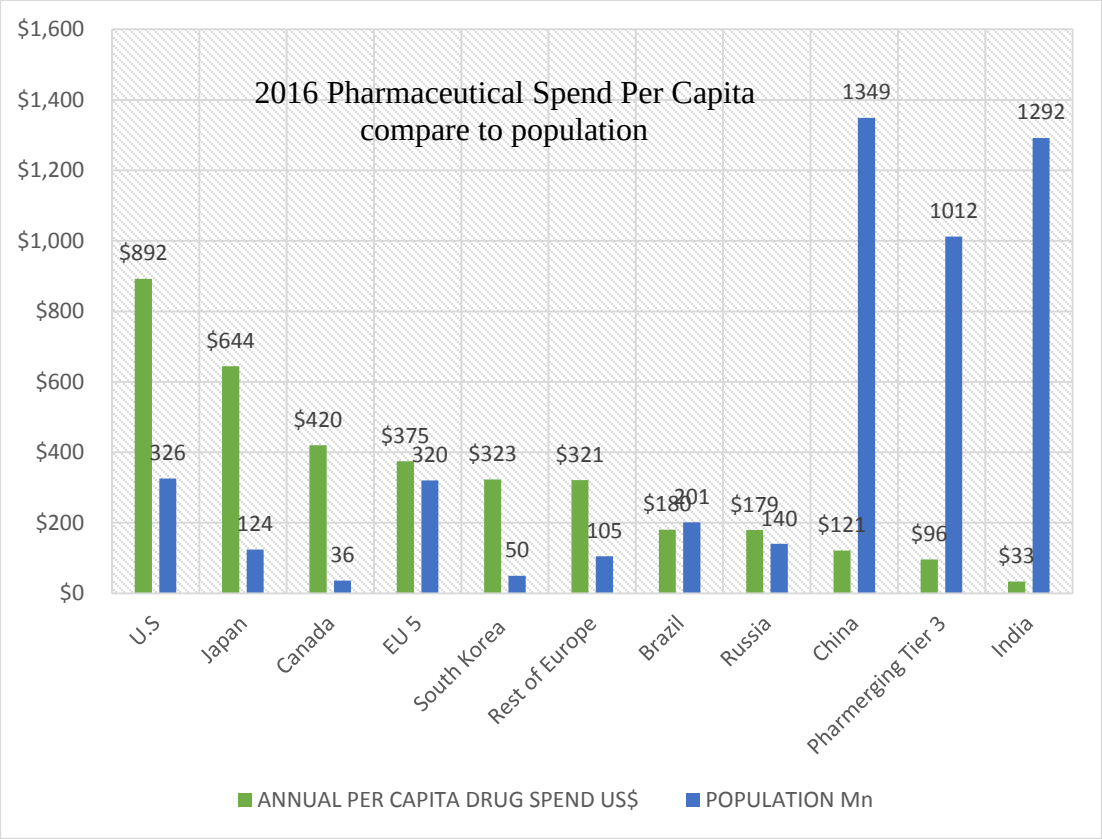

Figure1.3 – Annual per capita spending of pharmaceuticals in 2016

1.3 Indian Pharmaceutical Industry

1.3.1 Background

In India, the pharmaceutical industry is highly fragmented sector. More than 10,000 firms dominantly control about 70% of the market. The local players mainly rely on generic drugs that are specialized in anti-infective and basic drugs to treat common diseases (Usha Sharma, 2009). During 1972, the then government passed a law that allowed local producers to manufacture drugs that were still under patent, as long as they used different processes. Due to the lack of patent system in the country, the process of reverse engineering novel drugs and launching copy cats excelled (Sudeep Choudhury, 2009). Post-implementation of patent regime in India, Indian companies were not in a position to launch any new drug under patent protection. However, few Indian companies opted compulsory licensing route challenging the innovator company in the court citing the reason that these drugs were not affordable to the Indian patients. In couple of cases, Indian courts ruled in favor of Indian companies thereby setting a pathway for other Indian pharma firms. However, this is very expensive and time-consuming process and it requires a technical and legal expertise. Many Indian pharma companies opted to expand the operations beyond India to leverage their infrastructure, skilled workforce, cost-effective processes and government policies. In last two decades, most of the companies that met global standards spread their wings to overseas markets. Until February 2009, the Indian companies accounted for 35% of the Abbreviated New Drug Application (ANDA) approvals granted by the US Food and Drug Administration (FDA) (Joe C Mathew, 2009).

Pharmaceutical Industry in India is a swiftly growing industry. India stands among the top 5 pharmaceutical markets in the world. The last few years have seen a surge in sales of pharmaceutical products in India due to an increase in health and hygiene awareness. The total revenue generated through exports by pharmaceutical companies in India during the last financial year was more than $20 Billion. Table.1.3 captures the region wise exports done in 2015 and 2016. Exports when compare to the size of pharmaceutical companies appear to be less because of the lesser value. Indian pharmaceutical industry comprises of 250 to 300 large companies that account for 70 % of products in the market with a representation of top 10 firm’s contribution of 30% (KPMG International, 2016).

Table 1.3. Region wise exports by Indian pharma companies (Source – Pharmexcil 2016)

Region	Fy 15 (in mn$)	Fy 16 (in mn$)	Growth%	Share
North America	4517.94	5704.07	26.25	33.77
Africa	3089.03	3348.55	8.40	19.83
Asean	1055.62	1031.09	-2.32	6.11
Middle East	956.12	978.51	2.34	5.79
South Asia	616.27	624.49	1.33	3.70
CIS	701.22	614.94	-12.30	3.64
Asia (Excluding Middle East)	511.68	506.37	-1.04	3.00
Oceania	263.36	294.33	11.76	1.74
Other European Countries	139.57	140.08	0.36	0.83
Other America	59.49	63.60	6.91	0.38
Others	0.27	1.16	338.30	0.01
Grand Total	**15433.06**	**16889.18**	**9.44**	**100.00**

According to (IBEF 2016), looking at the current growth rate, the domestic Indian Pharmaceutical Industry would reach to nearly $50 billion in 2020 owing to many internal factors. The Indian pharmaceutical players, especially the larger ones have set up their subsidiary companies, regional offices, and even manufacturing plants in developed geographies to explore further opportunities of growth. Indian government has rolled out industry friendly policies to encourage the innovation and manufacturing to make pharma one of the most sustainable industry which can help in building country's economy.

Ministry of commerce and industry, Govt. of India has set up Pharmexcil (Pharmaceuticals export promotion council of India) to promote and support small, medium and large Indian pharma companies focusing on exports. Pharmexcil supports in terms of organizing the buyer seller meetings in India and overseas, financial support to set up exhibitions to highlight the products and technologies, reimbursement of part of the regulatory related expenses. Pharmexcil also maintains excellent global data of traders, agents, distributors,

marketers, manufacturers, regulators in pharma industry. This database is made available to all registered Pharmexcil members (Pharmexcil, 2016).

Indian pharma industry has been active in building huge infrastructure, product development, expanding operations, knowledge base, and intellectual property asset creation in the last decade. Having known for knowledge driven sector, it has also contributed to Indian economy by generating huge employment in all levels and contributing to Indian economy. Due to the global presence, pharma sector has helped to strengthen brand India along with Information technology sector. Industry has also made billionaires and built global organizations spread across the world. These companies inspire youngsters to become pharma entrepreneurs.

1.3.2 Structure of Indian pharma industry

Indian pharma industry is structured as illustrated in Figure 1.4. There are three major divisions viz Bulk drugs, formulations and NCE/ NBE research (Dun& Bradsheet, 2014). Today the industry is capable to develop, test, manufacture, register, commercial pharma products in the above areas. Industry started as a manufacturer of basic drug manufacturer and moved in to backward integration of bulk drugs. Bulk drug chemistry was pioneered by reverse engineering to optimize the process to improve the quality, increase the purity, bring down the impurity levels and reducing the cost of the process to become competitive in the global markets. This innovation is phenomenal and has helped Industry to become self-sustainable in the long run. Then the industry moved forward in the value chain to develop a strong portfolio of finished dosage formulations like oral solid dosages, injectable and topical preparations. After the initial success, the industry realized the need of new drugs that are game changer and entered in to new drug research. Some of the leading Indian companies have invested heavily in to basic drug research and successfully out licensed to MNC's. However, India is yet to launch its first indigenous NCE in spite of its phenomenal success in Bulk drugs and formulations.

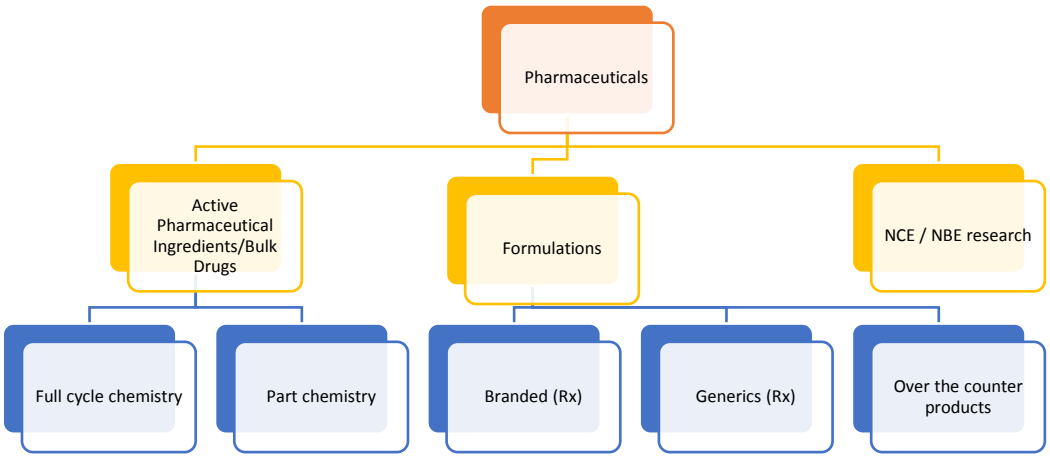

Figure 1.4 – Classification of Indian pharma industry (Dun& Bradsheet, 2014)

In the area of formulations, the industry has contributed to the global healthcare and country's economy. It has great infrastructure approved by global regulatory agencies. Generic drugs contribute to 70% of market share in terms of revenues, branded or patented drugs contribute to 21% and OTC drugs 9% to the total revenues of 20 Bn USD market. Coupled with the benefits of government initiatives, environment, robust ecosystem, and entrepreneurship, India has evolved as a leading manufacturer and supplier of pharmaceuticals in the world. India contributed 20% of global demand of generic drugs in terms of volume that is further expected to increase in the years to come (Dun& Bradsheet, 2014).

1.4 Overview of Leading Indian Pharmaceutical Companies

In spite of the good progress made by Indian pharma industry, the success rate in the global scenario is very less. This could be due to many factors that will be discussed in the next chapter. Based on the available data from various internet sources and respective company websites, an effort is made to briefly study the performance of top 10 Indian pharma companies based on market capitalization in 2016.

Sun Pharmaceuticals Industries Ltd. (www.sunpharma.com)

Sun Pharmaceutical Industries Ltd (Sun Pharma) founded in 1993 operates in the specialty pharmaceutical space with a portfolio of over 2,000 products – specialty products, branded generics, OTC products, ARVs, complex generics, pure generics & APIs. The key geographic business segments comprise of US formulations, India branded generics, emerging markets and Western Europe, Canada, ANZ & others. It caters to all major therapeutic segments such as psychiatry, anti-infectives, neurology, cardiology, orthopaedics, ophthalmology, nephrology, urology, dermatology, gynaecology, respiratory, oncology, dental and nutritionals amongst others. Its consumer healthcare business comprises of brands like Volini, Revital and Chericof. It operates 49 manufacturing sites across countries like India, US, Brazil, Canada, Egypt, Hungary, Israel, Bangladesh, Mexico, Romania, Ireland, Morocco, Nigeria, South Africa and Malaysia. In 2016, the company entered the Japanese market by acquiring 14 brands from Novartis; and entered into a distribution agreement with AstraZeneca for brands Oxra & Oxramet in India. In the year 2014, Sun Pharmaceuticals acquired Ranbaxy Laboratories Limited and became the largest pharmaceutical company in India and the fifth largest pharmaceutical company in the world. Market Capitalization: Rs 1, 89,139 Crores.

Lupin Ltd. (www.lupin.com)

Lupin Ltd. was founded in 1968 in Mumbai. In 1972 it operated as Lupin Laboratories Pvt. Ltd. and in 1983 it was incorporated as Lupin Ltd. The Company as on Mar 31, 2016 had 30 subsidiaries and a joint venture. Lupin's business portfolio includes Global Active Pharmaceutical Ingredients – APIs, Global manufacturing and supply chain and Research & Development. The company has 18 manufacturing units globally and in FY16 it made an investment of almost 12% of net sales in R&D. The US generics market is Lupin's largest revenue contributor with 43% of the company's annual revenue. This is followed by India with 25%, APAC 13% and EMEA 6%. In March 2016, Lupin acquired privately held US based manufacturing company GAVIS Pharmaceuticals LLC and Novel Laboratories Inc. During 2015 the company made four acquisitions; Specialty Product Portfolio of Temmler Pharma GmbH & Co. in Germany, Biocom in Russia, Medquimica in Brazil, and Pharma Dynamics in South Africa. Lupin commenced operation in Latin

American market in 2014 by acquiring Laboratories Grin S.A. De C.V., Mexico. It stands at second in the list of top 10 best pharma companies in India 2016. Incorporated in the year 1968, Lupin is one of the fastest growing and best pharmaceutical companies in India. The company produces more than 5,500 pharmaceutical products of premier quality. Company offers products in various therapeutic segments Neurology, Cardiology, Diabetology and Orthopedics.

Dr. Reddy's Laboratories Ltd. (www.drreddys.com)

Dr. Reddy's Laboratories Ltd. (Dr. Reddy's) incorporated in 1984 is one of the first Indian pharma companies to develop cost effective chemistry through reverse engineering and enter global markets early. The company has five technology development centers, two integrated product development facilities and three R&D centers. Dr. Reddy's products and services include Active Pharmaceutical Ingredients (APIs), Branded Formulations, Generic Drugs, Biologics, Specialty Products and New Chemical Entities (NCE). During FY16, the company's revenue was generated mainly from three segments – global generics contributed more than 80% to revenues, followed by Pharmaceutical services and Active Ingredients and Proprietary Products & others at 14% and 3%, respectively. Company has strong presence in North America, Europe and key countries in rest of the world. By August 2016 the company completed acquisition of eight Abbreviated New Drug Applications (ANDAs) in the US from Teva Pharmaceutical Industries Ltd., affiliate of Allergan plc (Dr.Reddy's,2016). Dr. Reddy's is the first and only pharma company in Asia pacific (Outside Japan) to be listed on New York stock exchange. Market capitalization: Rs 63,779 Crores.

Cipla Ltd.(www.cipla.com)

Cipla Ltd. incorporated in 1935 in Mumbai is a global pharmaceutical company with presence in over 100 countries. The company has 54 subsidiaries of which 11 are directly held. Cipla's business operations include – APIs, Respiratory, Cipla Global Access and Veterinary segments. It has occupied 4th place among the Indian Pharmaceutical companies and presently has operations in more than 150 countries. Headquartered in Mumbai, Cipla is a swiftly growing pharma company and employs more than 20,000 people. Cipla produces more than 2,000 products and owns more than 30 manufacturing plants in

different parts of the country. Some of the areas, of which Cipla offer products include Cardiology, Neurology, Nephrology, and Diabetology. Market Capitalization: Rs 48,788 Crores.

Aurobindo Pharma Ltd. (www.aurobindo.com)

Aurobindo Pharma Limited is ranked fifth in the list of top 10 best pharma companies in India in 2016. Incorporated in the year 1986, Aurobindo Pharma Limited started operations in India in 1988-99 with the establishment of the first manufacturing unit in Pondicherry. Aurobindo is one of the largest pharmaceutical companies with more than 20 manufacturing units in India and operations in more than 120 countries in the world. ARV, Antibiotics, Neurology, Cardiology, and Gastroenterology are some of the therapeutic areas. During FY15, the company exported to more than 150 countries that contributed to over 87% to Aurobindo's revenue. Aurobindo has vertically integrated production of APIs with finished dosages for almost 75% of its formulation products. In FY15 the company received final approvals to 215 ANDAs out of 398 filings in US. During the year, Aurobindo had filed 22 ANDAs, and it received 49 final approvals. The company has been granted 18 patents and has made 158 patent applications. Market Capitalization: Rs 47,578 Crores.

Cadila Healthcare (www.zyduscadila.com)

Cadila Pharmaceuticals Ltd (Cadila Pharma) established in the year 1951 is engaged in developing, manufacturing, selling and distributing pharmaceutical products. The company manufactures APIs & intermediates in its facility at Ankleshwar; while its formulations facilities are located in the state of Gujarat, Jammu and Ethiopia. Headquartered in Ahmedabad, Cadila is divided into Cadila Pharma and Cadila Healthcare/ Zydus healthcare and presently operates in over 100 countries. Cardiology, Respiratory, Gastroenterology, and Neurology are some of the therapeutic areas, for which the company offers products. The company has a large production capacity with a production capacity of more than 3,500 Million Tables and over 120 Million Capsules per year. Market Capitalization: RSK 31,541 Crore.

Divi's Laboratories Ltd. (www.divislabs.com)

Divi's Laboratories Ltd (Divi's) was incorporated in 1990 as Divis Reaseach Center. In 1994, it acquired its present name. Divi is engaged in developing new processes for the production of APIs and intermediates. The company operates mainly in two segments – generic APIs & nutraceuticals. It does custom synthesis of APIs, intermediates and specialty ingredients for innovator pharma companies. Some of its offerings also include generics, intermediates, protected amino acids, chiral synthesis, and carotenoids (synthetic). In FY16, exports accounted for nearly 88% of its gross sales, with Europe, North America and Asia being prominent markets. The company operates four manufacturing facilities at Nalgonda and the remaining three at Visakhapatnam, AP. It has overseas presence through its subsidiary companies namely Divis Laboratories (USA) Inc. and Divi's Laboratories Europe AG in Switzerland. The company is known for producing quality products for various therapeutic areas Cardiology, Dermatology, Diabetology, etc. Market Capitalization: Rs 28,609 Crores.

Glenmark Pharmaceuticals Ltd. (www.glenmarkpharma.com)

Glenmark Pharmaceuticals Ltd (Glenmark) was incorporated in 1977 and entered dermatology market in 1979. In 2001, Glenmark commenced API business and in 2004, bagged first out-licensing deal for discovery R&D with Forest Laboratories for asthma molecule, Oglemilast. Glenmark is an integrated pharmaceutical company operating in both branded and generic formulations, APIs and drug discovery & development. Its core therapeutic areas include dermatology, respiratory and oncology. Some of its prominent brands include Ascoril, Candid-B, Alex Plus and Telma-AM. The company operates across 40 countries and 17 manufacturing units in four continents. Its five R&D centers are located across India and Switzerland. In FY16, it commissioned a new formulations facility in US and a new GMP-grade biologics plant in Switzerland with up to 250 L batch size. During the same period, its international operations accounted for more than 70% of its total turnover. It launched Teneligliptin, a DPP-4 Inhibitor, for the first time in India. Glenmark came into existence in the year 1977 and presently operates in more than 90 countries across the globe. Market Capitalization: 23,410 Crore.

Torrent Pharma Ltd. (www.torrentpharma.com)

Torrent Pharmaceuticals Ltd (Torrent Pharma), the flagship company of Torrent Group that was incorporated in 1972. The company is engaged in the manufacture and sale of branded as well as unbranded generic pharmaceutical products. It is one of the dominant players in the therapeutic areas of cardiovascular (CVS) and central nervous system (CNS) and operates in the gastro-intestinal, diabetology, anti-infective, and pain management segments. It is experimenting into the therapeutic segments of nephrology and oncology while also strengthens its focus on gynecology and pediatric segments. Some of its prominent brands in India include – Shelcal, Chymoral, Nikoran, Dilzem, Nebicard and Nexpro. Torrent Pharma has manufacturing facilities at five locations namely – Indrad & Bharuch (Gujarat), Baddi (HP), Gangtok (Sikkim) and Pithampura, MP. In FY16, the US generics segment accounted for 40% of its revenues, followed by Indian formulations, which accounted for 27% share. During the same period, it launched three super specialty divisions namely – gastro, derma and rheumatology in its formulations segment. Market Capitalization: Rs 22,392 Crores.

Biocon (www.biocon.com)

Bioconfounded by Ms. Kiran Mazumdar Shaw in 1978 is a biopharmaceutical company head quartered in Bangalore. It is one of the first companies in India to focus in biological drugs and today it is India's largest biotech company. The company started with production of basic enzymes and moved to the development of chemical bulk drugs using fermentation technology. Biocon focusses on key therapy areas – Diabetes, Cancer, Nephrology, Cardiology and specialty segments. Company has set up its subsidiaries Syngene and Clingene focusing on contract research services and custom chemical services. Biocon has entered in to licensing agreements with Pfizer, Mylan and few global companies. Biocon has set up joint venture in Malaysia to manufacture Insulins. Biocon is the first and one of the largest manufacturers of human and recombinant insulins to treat diabetes. Biocon is the first company to launch biosimilar version of Trastuzumab. Company has strong presence in global markets like USA, Europe and many countries in emerging markets. Market capitalization: 22,107 crores.

Table 1.4 – Overview of leading Indian pharma companies

Sl. No.	Company	Estd.	Head Quarter	Market Capitalization in Rs (2016) Cr.	Global Presence	Therapy Focus
1	Sun Pharma	1993	Mumbai	189,139	USA, West Europe, ANZ & Emerging markets	CNS, Anti Infectives, Cardiology
2	Lupin	1968	Mumbai	65,823	USA, Japan, South Africa, LATAM	Diabetology, Ortho, Neurology
3	Dr Reddy's	1984	Hyderabad	63,779	USA, Germany, Russia, Emerging markets	Cardiology, Anti-cancer, Gastro
4	Cipla	1935	Mumbai	48,788	Africa, Asia, Europe	ARV, Respiratory, Anti infectives
5	Aurobindo Pharma	1986	Hyderabad	47, 578	USA, Europe, China	ARV, Anti Infectives, Neurology
6	Cadila Pharma	1951	Ahmedabad	31,541	Africa, Asia, LATAM	Cardiology, Diabetology, OTC
7	Divis Labs	1990	Hyderabad	28,069	North America, Europe	API business
8	Glenmark	1979	Mumbai	23,410	USA, Emerging markets	Dermatology, Cardiology, Diabetology, Respiratory
9	Torrent Pharma	1972	Ahmedabad	22,392	USA, LATAM, Asia,	Neurology, Diabetology, Cardiology
10	Biocon	1978	Bengaluru	22,105	Europe, Japan, Emerging markets	Insulins, Cardiology, Diabetology, Oncology

As per the information available on respective company websites captured in Table 1.4, analysis of leading Indian companies reveals that pharma firms have done very well in the last two to three decades. Companies built huge infrastructure, developed good product portfolio, expanded in to global markets, and created multi billion dollars of wealth to all

stakeholders. Successful companies inspired many entrepreneurs to set up the new companies by following the leadership strategies. In the next chapter, analysis of Indian pharma industry will give some insights of the challenges and opportunities.

1.5 Analysis of Indian Pharma Industry

Many influential factors could affect the pharma industry in future. Many authors feel some of them are intrinsic in nature and some are extrinsic. Indian pharma industry is one of the success stories in India and developing countries because in a span of three decades India could become world's largest manufacturer of medicines. Some of the key factors are mentioned below**.**

1.5.1 Factors affecting Indian pharma industry

Skilled workforce - India has the largest skilled workforce in pharma industry. This for sure offers a competitive edge over other countries. Despite of the drawbacks in some sectors, the pharmaceutical companies in India utilize their competitive advantages over the manufacturers of traditional drugs in the industrial countries in the west.

Bulk drug production - Being leader in bulk drug, Indian companies have always been competitive globally. Bulk manufacturing of drugs is another major advantage that Indian pharmaceutical industry offers. According to (Pharmexcil) estimates, manufacturing of bulk drugs in India would reach 28 billion by the end of 2017 (Pharmexcil, 2016).

R&D costs - R&D costs in India is $1/10^{th}$ of the cost in developed countries. Lot of pharmaceutical technologies and Indians are returning to home country with a reverse brain drain concept. They bring in huge expertize which will add further strengthening to development area. This will enhance our position in R&D area. It has been well established that generally, large companies look to invest in in-house R&D by searching for innovative companies and then sourcing their technology externally. Thus, given all the favourable points, India could be one of the best destinations for R&D. (Blonigen, B. A. & Taylor C. T, 2000)

Patent expiry - The growth and profitability may have a considerable impact when there is a loss of patent protection for a blockbuster drug that formed a considerable sales proportion. In the coming years around 60 billion USD worth drugs will go off patent. This

could be a huge opportunity for India if Indian Pharmaceutical companies could grab the share. New change in the TRIPS allows more uniformity towards property rights to the members of WTO. As quoted by (Saibaba & Aragwal, 2001) TRIPS facilitates free flowing investment and technologies among the WTO members. India can be immensely benefited if its patent laws are modified accordingly. The Indian pharma industry can take advantage of the patent law by producing new drugs or off patent products. Some companies have opted for compulsory licensing route to win the patent challenged by MNCs. Collaboration with multinational companies in marketing newer products, improve production standard, increase exports, and remove its sole concentration from R&D. This change has encouraged foreign pharmacies to enter the Indian market more boldly quoted by (Alka Chadha, 2016).

Geographic expansions - In the present years the rapid economic growth in the emerging markets has given the pharmaceutical companies to expand beyond India. Many companies have spread their operations across all developed and developing countries. Major revenues of the leading pharma companies are from overseas markets. The acquisitions and mergers enable companies with an easy access to the local market with a sales force that is already present, local relationships and the channels of distribution.

Boost from population growth - Due to the rise in population there has been a great boost to the pharma sector of India. As per the estimates of (UN), the population would increase from 1.1 billion currently to 1.4 billion by the year 2020. By the year 2025 India would be the most populated country in the world overtaking China. Due to growing population, domestic demand increases and companies can be self-sufficient in domestic market and produce cost effective treatments. Because of huge population, conducting clinical tests is much easier. (Gehl Sampath & Padmashree, 2006)

Ageing population - As per WHO, the requirements for healthcare will rise and the use of drugs will be for a longer time. For example, the world's ageing population is facing disease and disorders like Alzheimer's disease, cancer, diabetes, etc. The drugs dealing with increasing multi-factorial disorders like cancer and disorders of lifestyle like obesity would probably face strong growth of revenue.

Foreign direct investment (FDI) - The pharmaceutical FDI are dedicated to a great extent to acquisitions, takeovers and mergers in order to assist the parent firms to increase their power over the functions carried out in India (Abrol.D., 2004). The global mergers in the

same lines have affected the foreign pharmaceuticals firms. The chief driver for acquisitions and mergers for the pharmaceutical MNCs in India still control strongly over the ownership of investments.

1.5.2 Impact of FDI on Indian pharma sector

The data published by the Reserve Bank of India (RBI) suggests that Indian pharma industry attracted US$1707.52 million worth of foreign direct investment (FDI) between April 2000 and April 2010. The FDI is exclusive of investments in shares. The acquisitions and mergers of local players by large MNCs indicate the level of interest that the global players show in Indian market. MNC acquisition in the Indian Pharma started in 2008 with the acquisition of Ranbaxy by Japanese drug maker, Daiichi Sankyo for US$4.6 billion. Post this the trend of high valuation of Indian Pharma companies continued. In 2010, Abbott Inc. acquired Piramal Healthcare in a deal worth US$3.7 billion, a valuation that was nine times the value of Piramal's revenues. While the global economy faces one of its worst economic crises in the modern history, the Indian pharmaceutical industry remains an attractive investment destination for foreign investors. (Alka Chadha, 2006)

The RBI issued guidelines for FDI in pharmaceutical industry in India through the following two routes: (RBI, 2011)

1. **Automatic route**: Prior approval by either the government or the RBI is essential. Under the existing policy, FDI is permitted up to 100% for Greenfield projects.

2. **Advance government approval route**: FDI proposals are considered in a time-bound and transparent manner by the Foreign Investment Promotion Board (FIPB) under the Department of Economic Affairs, Ministry of Finance. Here also 100% FDI is permitted for investment in existing companies in brown field projects.

Factors that lead to Constant Flow of FDI in Pharmaceutical Sector

- Increase in domestic demand and rise in outsourcing activities

- Growth in healthcare financing products: After the introduction of health Insurance, programs in the country the Health finance sector acquired phenomenal growth. This has resulted in an increase in healthcare spending, which in turn, has benefitted the pharmaceutical industry.
- During 2008-2016, prescription drugs worth about US$ 300 billion lost the patent status, mostly from the US. Indian pharmaceutical industry that relied mostly on Generic drugs got a huge favor. (India Pharma Inc 2010)
- Demand from emerging segments: Emerging segments like contract research and development, biopharma, clinical trials, bio-generics, personalized medicines, medical tourism and pharma packaging are also expected to contribute and drive growth of the Indian pharma.
- Patent Expiries: A large number of block buster branded drugs are going off patent in the coming 3-5 years. Hardly there are potential molecules in the pipeline for some years to come. This will put pressure on the global pharma giants to look beyond the North America, Europe and Japan for new growth opportunities (Kumar 2013).

Apart from these factors, the advantages offered by India in terms of economic reforms, cheaper labor cost, geographic closeness to source countries like China etc. have contributed towards attracting FDI in the pharmaceutical sector. It is easy to get good quality bulk drugs, which is attractive for foreign firms. Because of India's focus on reverse engineering and development of production processes, India has acquired high technical competence in the production of pharmaceuticals. To add to its attractiveness, the Indian Department of Pharmaceuticals has prepared "Pharma Vision 2020" aimed at making India one of the leading destinations for end-to-end drug discovery and innovation though a state financed venture capital fund to improve pharma infrastructure, making India an attractive destination for pharmaceutical companies looking to escape cost pressure in mature economies.

1.5.3 SWOT analysis of Indian pharma industry

Based on the in-depth analysis in the previous chapter, due to its strengths, Indian pharma will continue to grow. Sector has its weakness and threats as quoted by (Kumar K and Kulashetra, 2013). SWOT analysis in table 1.5 gives insights of Indian Pharma Industry.

Table 1.5: SWOT analysis of Indian Pharma Industry

Strengths	**Weakness**
• Increasing treatment inexperienced patient population • Cost effective innovation, manufacturing and operations • Higher GDP growth leading to increased disposable income in the hands of public and their positive attitude towards spending on healthcare. Insurance coverage and evolving pattern of enhanced per capita spending • Data management functions for clinical trials • Fair protection of intellectual property rights • Ecosystem to create biosimilars and attractive marketing paradigms	• Low investments in innovative R & D • Poor all-round infrastructure is a major challenge • Poor health insurance coverage • Stringent pricing regulations affecting the profitability of pharma companies • Majority of companies lack the ability to compete with MNCs for New Drug Discovery, Research of molecules on a worldwide basis due to lack of resources • Apart from Pharmaceutical , absence of big indigenous clinical research company & associates and credibility of ecosystem • Uniform Regulatory Body • Slow rate of M&As • Drug Abuse :Missing treatment protocol in major Medical institutes
Opportunities	**Threats**
• Increasing global demand for generics and OTC market • Public-Private Partnerships for strengthening Infrastructure • Opening of the health insurance sector and increase in per capita income - the growth drivers for the pharmaceutical industry • Export opportunities • Opportunity to launch many products as billions of worth of drugs to go off patent	• Increasing salary and expenses • Intensifying umbrella of the Drugs Price Control Order (DPCO); unrealistic control on product prices and profitability • Entry of well-equipped technology-based products from foreign players into the Indian market • Lack of proper systems and issues complicate possibility of conducting clinical trials in India • Talent Drain : Off shore talent acquisition

1.6 Micro, Small and Medium Scale Enterprises

1.6. 1 Introduction

The Micro, Small and Medium enterprises (MSMEs) play an important role in economic growth and in promoting equitable development all over the world. The very existence of MSME sector is inevitable equally in developed, developing or under developed nations. The major advantage of this sector is its pivotal role through its contribution to industrial output, exports, and crucial role in employment generation at low cost. The labor intensity of the MSME sector is much higher than that of large enterprises. The MSMEs constitute over 90% of total enterprises in most of the economies thereby generating the highest rates of employment growth and account for a major chunk of industrial output and exports. MSMEs play a nurturing role in country's development and economy because they offer effective, efficient and flexibility features (Kristen Hallberg, 2000). The MSMEs are critical in the economic and social development of the country, often acting as a nursery of entrepreneurship (Edinburg group, 2013).

1.6.2 Challenges faced by MSMEs

Some of the key challenges faced by MSMEs are listed below:

- Access to adequate finance to run the business
- Limited capital and knowledge, non-availability of latest technology
- Low production capacity and high cost of credit
- Ineffective marketing strategy to enter and sustain in competition
- Lack of skilled manpower for manufacturing and services.
- Lack of access to global markets; constraints on modernization by adopting new technologies
- Problems of storage, designing, packaging and product display
- Inadequate infrastructural facilities including power, water and roads

1.6.3 Classification of MSME's

In India MSMEs are classified based on the investment ceiling for both manufacturing and service industry as illustrated in Figure 1.5.

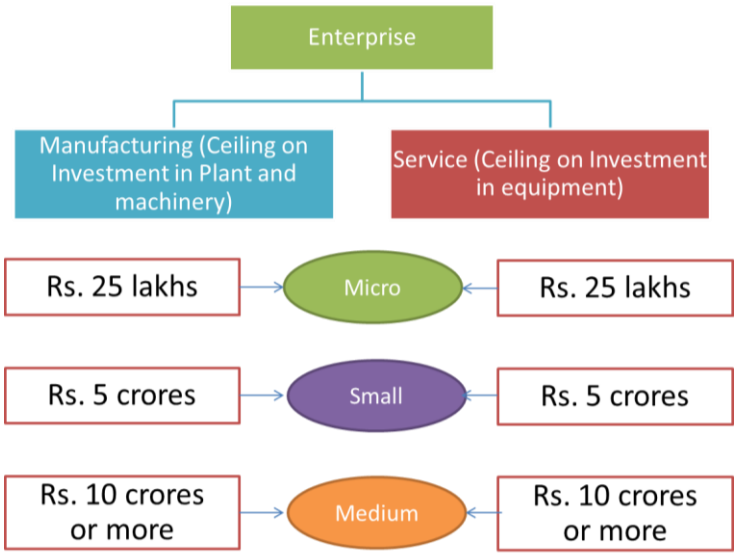

Figure 1.5: Classification of MSME structure in India (Mukund Chandra Mehta, 2013)

1.6.4 MSMEs contribution to world

The data from the OECD, 2012 suggested that about 46 million MSMEs across various industries employed 106 million people. With close to 94% of this sector being un-organized, informal, and un-registered, initiatives to have more enterprises registered remains a challenge. Growth of MSMEs will fetch new employment to the unemployed people. When compared with other countries India's contribution to MSME is very low. Developed countries like UK and US contribution of SMEs and Non SMEs is the same as mentioned in Figure 1.6 (OECD, 2012).

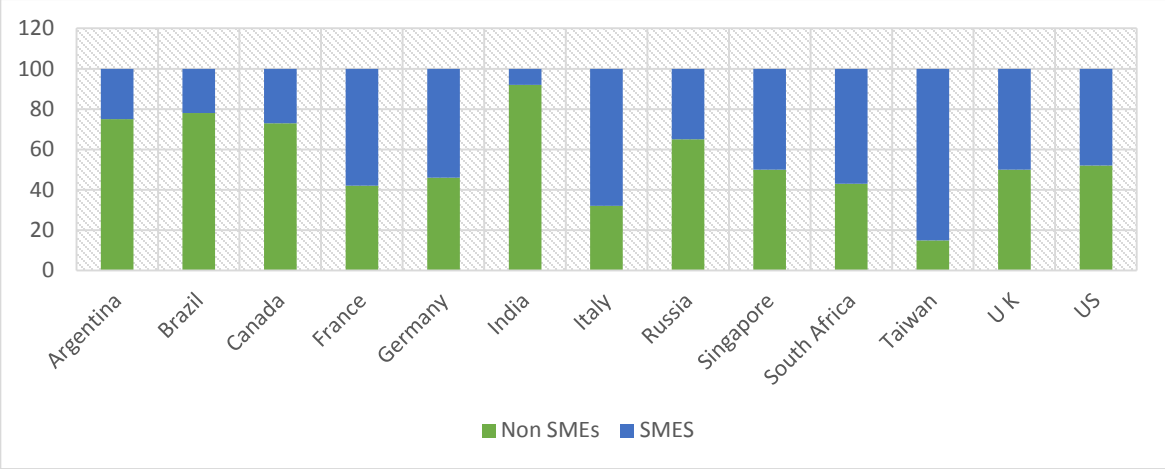

Figure 1.6: Comparative contribution of SMEs and Non SMEs in select industrial countries (Source:OECD,2012)

When combining the available data, SMEs account for 52% of private sector in terms of value, which provides a reasonable estimate for the sector's global economic contribution (ACCA, 2010). The contribution of SMEs to economic growth varies substantially across countries – from 16% of GDP in low-income countries (informal sector) to 51% of GDP in high-income countries (organized and registered). The contribution of the SME sector to GDP, including both the formal and informal sector is disproportionately large in low-income countries. Thus, it is quite evident that the MSMEs play a key role for any country as a growth engine. It is of utmost important for policy makers, academicians, and industry leaders to understand the challenges and gaps and develop a policies and framework to develop this sector to drive the future.

1.6.7 MSMEs contribution in India

The MSME sector in India is highly heterogeneous in terms of size, variety of products/services and levels of technology. As India equips itself for high growth path, the MSMEs sector assumes a key role in driving the growth engine (Make in India, 2016). Since the very beginning of planned economy from 1951 and the subsequent industrial policy, both the planners and the government earmarked a special role for MSMEs in the Indian economy. Since the adoption of policy of liberalization and globalization, MSMEs always represented the model of socio-economic policies of Government of India. MSMEs

played an important role in the judicious use of foreign exchange for import of capital goods and materials; labor-intensive mode of production; employment generation; non-concentration of diffusion of economic power in the hands of few as in the case of big houses. It can be observed that largely, MSMEs in India met the expectations of the government and achieved the following objectives (KPMG, 2015):

- Low investment and high returns through higher contribution to domestic production
- Operational flexibility and mobility
- Low intensive imports and significant export earnings
- Capacities to develop appropriate indigenous technologies
- Contribution towards defense production; technology oriented industries
- Increase in competitiveness in domestic and export markets

Despite the above limitations, MSMEs have played a promising role in both technological development and exports. In addition to chemicals and pharmaceuticals, MSMEs today are established almost in all-major sectors in Indian industry. Because of globalization, liberalization, and WTO regime, the Indian SMEs are currently in the transition phase. The Indian SMEs continue to face several challenges – slow down of US, European economy, and increased competition from China. The current Indian government's "Make in India" campaign with a thrust for indigenous manufacturing of all kind of products and new initiatives such as "Start-up" incentive schemes are boosting India as a manufacturing hub. Those MSMEs who have strong technological base, international business outlook, competitive spirit, and willingness to restructure themselves shall withstand the present challenges and come out with shining colors to make their own contribution towards the economy.

1.6.8 MSMEs in pharmaceutical sector

According to the Confederation of Indian Industries, around 10,000 MSMEs in India account for about 70–75% of the total pharma units in India. The involvement of Indian MSMEs in the field of CRAMS, clinical research, R&D etc., have driven them to play a definitive role in the global pharmaceutical environment. The Indian government has been making every attempt to support MSMEs through several incentives like DEPB (Duty exemption passbook scheme), tax rebates etc., for select products in specific territories.

Ministry of pharmaceuticals is also setting up biopharma clusters with plug and play facilities for start-ups, dedicated pharma zones for bulk drugs and formulations, single window clearances, financial assistance through innovative schemes, and other benefits (India Pharma Inc., 2010).

1.7 Summary

With a change in disease trends, latest technologies in diagnosis, increased average life, increase in health consciousness, implementation of healthcare programs by the governments and access to newer drugs, the future of global pharma industry is optimistic.

During the last decade, Indian pharma industry has been active in building huge infrastructure, product development, expanding operations, knowledge base, and intellectual property asset creation. Being a knowledge driven sector, the Indian pharma industry has generated huge employment at all levels and contributed to Indian economy. Due to its global presence pharma sector has helped to strengthen brand India in line with information technology sector. Industry has also made billionaires and built global organizations spread across the world. These companies inspire youngsters to become pharma entrepreneurs.

MSMEs in Pharma industry continue to contribute to the Indian industry and economy. India being a country with excellent human resource, MSMEs generate employment at lower and middle level of employees. It is also observed that due to lack of resources these companies find it difficult to sustain and grow. These companies also innovate processes and products but due to lack of resources, they are unable to convert to commercial success. However, medium sized companies have reasonable resources compare to micro and small industries because of the experience. If these companies can adopt new technologies, they can move to the next level in a decade or two.

CHAPTER II

LITERATURE REVIEW

After identifying a problem area, secondary data were collected by referring to published articles from various journals, company websites, and books and published annual reports. Internet was the major source to surf the digital libraries and company information to study the strategies followed by successful Indian and multinational companies. It was followed by the study of various general strategies followed across the different sectors of the industry and also the digital tools or applications used in pharmaceutical industry. Data from leading market research firms were also studied to collect secondary data keeping in mind to ensure the credibility and validity of the information collected. Phase wise approach was adopted in the review of literature as described in this chapter.

2.1 Evaluation of Successful Indian Pharma Companies during Last 10 Years

After reviewing top 10 Indian pharma companies, evaluation of five leading Indian pharma companies was carried out to understand their growth from 2005 to 2015. Data were collected from internet and respective company websites focusing on key parameters such as revenues, earnings per share, employees, and overall performance in various in 2005, 2010 and 2015. Based on the information and data acquired, attempt was made to list down key strategies for the phenomenal growth of these companies during last decade.

Sun Pharmaceuticals Limited (www.sunpharma.com)

Founded by Mr. Dilip Sanghvi in the year 1983 in Vapi, Gujarat with a workforce of five people and five products has achieved enormously. Today Sun pharmaceuticals is ranked no.1 Indian Pharmaceutical Company. The company focused on Niche Segments such as Psychiatry and life style drugs, the company has raced ahead with its business growing four folds from 1999 to 2000. The company set up a manufacturing unit at Vapi, Gujarat to

manufacture medicines for psychiatry. The main focus of Sun was on the high-margin chronic care therapy products that have made the company very profitable.

Known to be extremely conservative, the company desisted from overpaying for assets or getting carried away by bids from peers. That's the reason why Sun hasn't made any big acquisitions since it first bought into the Detroit-based Caraco Pharma in 1987 and took over, over a period of time for USD50 million. Industry watchers are convinced that Sun's more recent takeovers, including Valeant and Able Pharma, too will soon turn profitable.
The moment it acquired Tamil Nadu Dadha Pharma it gained entry into the oncology space; with Milmet Labs it was able to acquire expertise in ophthalmology, while with Valeant it penetrated the controlled substances segment. Its latest acquisition is the Israel-based Taro, which Sun has bought for an enterprise value of USD 454 million. The $300 million generics player, which has a subsidiary in Canada, is a strong contender in the dermatology segment accounting for more than 50% of its revenues. When Sun Pharma started selling its products at a national scale, way back in 1987, it ranked a low 108 on the ORG list. Today, with a domestic market share of 3.2%, it is ranked number six as a Sun pharma standalone. The numbers tell the story, whether it is building a profitable business or creating wealth for his shareholders. In March 2015 Sun acquired Daichi-Ranbaxy, the largest Indian pharma company and went on to become 5th largest generic company in the world. With this acquisition, Sun was able to strengthen its business in emerging markets and India. It expanded the branded generics business that Ranbaxy was leader.
Sun Pharma's buyouts have been well thought out. In almost every instance, the company has managed to diversify into new areas. Sun Pharma’s key strategies are acquisitions of stressed assets, successful integration in to Sun culture and focus on brand building in acute therapies to gain the maximum share and increase the rankings.

Table 2.1: Analysis of performance of Sun Pharma from 2005 to 2015

Parameter	**2005**	**2010**	**2015**
Revenue	0.847 Bn USD	1.480 Bn USD	4.5 Bn USD
Earnings Per Share	24.84	13.40	-4.50
No. of Employees	10,000	11,200	30,000

Aurobindo Pharma Limited (www.aurobindo.com)

Founded by Mr. Ramprasad Reddy in 1986 to set up a small beta-lactam manufacturing facility in Pondicherry, Aurobindo went on to become one of the leading global generic players. Today Aurobindo is a leading global pharmaceutical company producing oral and injectable generic formulations and APIs. Consolidated revenues were 138,960.8 million in 2015-16, with a CAGR of 33.4% over the past three years. Strengthened by several large manufacturing facilities approved by US FDA, UK MHRA, MCC-SA, ANVISA Brazil for both APIs & formulations and with strategic alliances with 46 subsidiaries & joint ventures, Aurobindo features among the top 5 companies from India in terms of consolidated revenues. Aurobindo has been ranked as No. 7 prescription supplier in the US as per IMS total prescriptions dispensed as of March 2016. The Company is among the top 15 generics companies by sales in Europe (Aurobindo Pharma, 2016). The Company exports to over 150 countries across the globe with more than 87% of its revenues derived from international operations. Headquartered at Hyderabad, India, the company has a robust product portfolio spread over seven major therapeutic/product areas encompassing neurosciences, Cardiovascular, Gastroenterological, antibiotics, ARVs, Anti-diabetics and Anti-allergics, supported by an outstanding R&D set-up. There is a well-entrenched US portfolio of 398 ANDAs filed, of which final approvals received for 215 as at March 2016.

Aurobindo pharma has built leadership position with its technical excellence, expertise in quality assurance, compliance with regulatory standards, and being recognized for cost competitiveness and customer focus. Aurobindo aims to gain market share for existing products and by introduction of new products (presently 147 ANDAs under review including 40 ANDA filings for injectable products) with a pipeline of products in neurosciences, cardiovascular, ophthalmic, respiratory, peptides, and penems. Strategic initiatives include gaining entry into complex R&D in new businesses and differentiated technology platforms such as oncology, hormones, enzymes, peptides, depot injections, inhalers, and nasal and dermatology products. Plans are to expand penetration of OTC products and capitalize on future OTC conversions and enhance nutraceuticals business profitably through a combination of cost and growth synergies. To synergize this, Aurobindo acquired US based nutraceutical company “Natrol” in 2015. In Europe, it

acquired Actavis business in the Western Europe and turned it around and ramp up own filings. Forward plans include launch of new ARV products and combinations as well as grow the existing market. New geographies are being explored in the emerging markets. API capacities are being augmented to support growth in advanced markets. Aurobindo's strategy revolves around wide product portfolio, leadership in bulk drugs, expansion in to developed markets, building huge infrastructure, vertical integration.

Table 2.2: Analysis of performance of Aurobindo Pharma from 2005 to 2015

Parameter	**2005**	**2010**	**2015**
Revenue	0. 300 Bn USD	0.89 Bn USD	2.0 BnUSD
Earnings Per Share	32.5	17.6	32.17
No. of Employees	4,476	8,500	11,500

Dr. Reddy's Laboratories Limited (www.drreddys.com)

Anji Reddy, a pioneering scientist-entrepreneur founded Dr Reddy's Laboratories Limited (DRL) in 1984 as a manufacturer of bulk drugs. Over the last three decades, DRL has emerged as an integrated global pharmaceutical company that offers a wide range of products including APIs, generics, biosimilars, and differentiated formulations. Nearly 80% of the company's revenues are derived from overseas markets including United States, Russia and Commonwealth of Independent States (CIS) and Europe, apart from other select geographies within emerging markets. Today DRL is a US $2.5 billion company. Nevertheless, it started in 1984 as an active ingredients manufacturer and went on to become the largest pharma company. The founder, Dr Reddy, was a chemical technologist experienced in the public sector unit of Indian Drugs and Pharmaceuticals Limited. From there, he started several entrepreneurial ventures, and ultimately ended up with DRL. Those were the days when India had import tariffs upwards of 100%. People who could develop technologies and manufacture products could generate good revenues. However, with competition, companies had to look for growth internationally. So just after there, DRL moved on to opening representative offices in key geographies, such as the US, Europe, Russia and so on. Along the way, company moved up the chain from pharmaceutical ingredients to finished dosages.

One big acquisition Dr. Reddy's made for market entry was the acquisition of Betapharm in Germany. Everywhere else, it first established an organic presence or established a partnership and learnt more about the market before making an acquisition. The big bang acquisition in Germany was, in retrospect, a mistake. It has acquired a company as an entry strategy without understanding the local markets and without fully understanding how the legislation was evolving.

Unlike Sun pharma and Aurobindo pharma, Dr. Reddy's always focusses on development and manufacturing of differentiated products in key therapeutic segments. In fact, DRL was the first Indian pharma company to start investing in basic drug discovery research and out-licensed promising molecules to leading global companies like Novartis and Novo Nordisk. Unfortunately, these molecules could not lead to commercialization due to safety concerns in the final stage of clinical trials. DRL is also the first company from Asia pacific (Outside Japan) to be listed on New York stock exchange and first Indian pharma company to get 180-day exclusivity for fluoxetine in USA. DRL is known for building power brands, implementing latest technology, upgrading quality systems, supporting innovation, encouraging learning, and nurturing entrepreneurship. This has made DRL as most preferred employer in healthcare segment in India continuously.

Table 2.3 : Analysis of performance of Dr. Reddy's Labs from 2005 to 2015

Parameter	**2005**	**2010**	**2015**
Revenue	1.00 Bn USD	1.480 Bn USD	2.3 Bn USD
Earnings per share (Diluted)	27.53	52.51	79.14
No. of Employees	7500	17,000	20,372

Cipla Ltd. (www.cipla.com)

In 1935 with an established vision to meet the healthcare needs of India, Dr. K A Hamied laid the foundation of Cipla in 1935. In 1960, the stage was set for API development in India by establishing first manufacturing plant. By 1970, Cipla spearheaded India's patent regime to make India the pharmacy hub of the world. In 1980, Cipla received first US FDA approval for its manufacturing facility. Manufacturing facilities were set up in succession in Goa, Bangalore, Indore. Medpro acquisition happened in Republic of South Africa.

CIPLA is the 3rd largest Pharmaceutical companies in India with a presence in over 150 countries. Cipla has been catering its ARV products to the maximum number of patients suffering from HIV drugs. The role of automated equipment with high accuracy, and compliance exists in CIPLA. Qualified, experienced, and trained staff were recruited to handle respective functions. The use of four eye principle-"doer" and "checker" for key activities is omnipresent in CIPLA.

Cipla Global Access mainly concentrates on four key therapy areas —HIV/AIDS, Malaria, Multi Drug-Resistant Tuberculosis and Reproductive Health It has signed sub-licensing agreement with Medicines Patent Pool (MPP) to manufacture generic HIV medicines atazanavir (ATV) and dolutegravir (DTG) . The company entered into non-exclusive licensing agreement with Gilead Sciences, Inc. to manufacture Hepatitis C medicine to manufacture and market it in over 90 countries including India and South Africa. Cipla has also Signed sub-licensing agreement with MPP to manufacture anti-AIDS drug tenofovir alafenamide (TAF), collaborated with Medicines for Malaria Venture (MMV) for development of rectal artesunate for pre-referral treatment of children with severe malaria. The company has secured 3-year tender contract from The Global Fund for supply of ARV treatments in 140 countries. Cipla has developed the taste masked Lopinavir/Ritonavir pellets (FDA approved in June 2015), for launch in 20 countries in 2016, collaborated with DNDi (Drugs for Neglected Diseases initiative) and UNITAID for development of 4-in-1 taste masked sprinkles formulation of the combination Lopinavir/Ritonavir, Lamivudine and Abacavir or Zidovudine.

Cipla's key strategies are to focus on collaboration with global funding agencies, licensing agreements with global majors, innovations to develop tailor made products in neglected/ epidemic disease, emerging markets and implementation of latest technology.

Table 2.4: Analysis of performance of Cipla from 2005 to 2015

Parameter	**2005**	**2010**	**2015**
Revenue	0.473 Bn USD	1.130 Bn USD	1.675 Bn USD
Earnings Per Share(EPS)	20.26	11.96	17.35
No. of Employees	5,221	10,045	22,036

Lupin Laboratories Limited (www.lupin.com)

Dr. Deshbandhu Gupta established Lupin limited in the year 1968. He was a professor of BITS Pilani who had a noble vision to fight the then prevalent diseases that destroyed numerous lives. Very quickly, Lupin produced some major drugs for most common diseases, like Asthma, TB, Diabetes, Cardiovascular problems and NSAIDS. However, it was only after becoming the largest producers of the anti-TB drugs that Lupin Limited came to be known widely. Now, the company is widely spread across South Africa, USA, Japan, Australia, Philippines, and the Europe. The path to turn things around was not at all an easy task, especially in a thriving sector like Pharma. Currently, Lupin is one of the top 5 pharmaceutical companies in India and 14th largest producer of generic drugs in the world. It is also one of the fastest growing generic pharmaceutical companies in South Africa.

The implementation of a network of 11 integrated manufacturing facilities at Lupin provides a portfolio of highest quality generic products globally. The world-class facilities that constantly comply with quality, safety, environment standards as laid down by governments and leading regulators such as the US FDA enable Lupin to deliver a wide range of finished products to the US market. The focus at Lupin is in-house product development with proprietary oral controlled release and taste masking platforms. Lupin is recognized as a leading manufacturer of cephalosporin API's, with FDA approval to manufacture complex oral and injectable cephalosporins. Lupin Pharmaceuticals, Inc. provides advanced manufacturing capabilities and processes that create quality specialty and generic products. Lupin has made some acquisitions in Japan, Europe, and USA to strengthen its product portfolio and expansions.

Core strategies followed by Lupin are establishing leadership in therapeutic segment like anti-tuberculosis drugs, building branded generics, expansion into developed countries, strategic acquisitions for synergy, upgrading the infrastructure with latest technologies etc.

Table 2.5. Analysis of performance of Lupin Labs from 2005 to 2015

Parameter	**2005**	**2010**	**2015**
Revenue	0.500 Bn USD	1.007 Bn USD	1.89 Bn USD
Earnings Per Share	45.52	18.15	64.03
No. of Employees	8,000	10,500	15,000

Table 2.6: Summary of strategies followed by Top 5 Indian Pharma companies in last 10 years

Company	Strategies followed during the last decade					
	Segment focus strategy	**Product strategy**	**Marketing Strategy**	**Global strategy**	**Partnership strategy**	**Technology/ Digital tools**
Sun Pharma	Formulations API	Psychiatry, anti-infectives, OTC	Building global brands, Campaign based marketing	USA, EU, Africa, Asia, LATAM	Direct marketing, major acquisitions to fill the gaps	SAP, CRM, QMS, LMS, Cloud networking
Dr. Reddy's	API, Formulations, New drug research	Differentiated niche, products, CVS, Oncology	Global brands building, strong marketing through field force	USA, EU, Russia, CIS,	Direct marketing, In-Licensing, Major acquisitions	SAP, CRM, QMS, LMS, Cloud networking, QbD
Aurobindo	API, Formulations	Broad range of products, Cephalosporins, beta-lactams, CNS, ARV	Not keen in building brands, More focus on generic model	USA, EU and	Partnerships, Out licensing, acquisitions,	ERP, QMS, LMS, Cloud networking
Cipla	Formulations Formulation technologies	ARV, Respiratory, Anti-allergics, Gastroenterology	Partnership with funding agencies, leadership in respiratory	USA, Africa, Asean	Direct presence, partnerships, major acquisitions	SAP, CRM, QMS, LMS, Digital marketing, QbD
Lupin	Formulations API	Anti-tuberculosis, Cephalosporins, Oncology	Global leaders in TB drugs, Strong focus on branding through field force	USA, EU, Japan, Asean, Africa	Direct marketing, Joint venture, acquisition	SAP, CRM, QMS, LMS, cloud networking, Digital marketing

Evaluation of top 5 Indian pharma companies has revealed that the success of these companies was due to identification and implementation of right strategies – segment focus, product portfolio, marketing, global, partnership and automation cum technology upgradation. Last decade has seen the revolution of latest technologies. These successful companies have adopted digital technologies to scale up their operations across all verticals. This transformation was required to compete and sustain the competition in global markets. Despite higher associated costs, these companies invested in automation and digital prescriptions. In the current scenario going digital is not very expensive due to the

availability of various updated digital tools customized to the need of a company. It is very important for a medium-sized company to embrace these technologies as per the need of the company to automate as much process as possible. This helps the company to scale faster and optimize its business strategies due to easy accessibility of analytics without having the need to do trials, see failure, and learn.

The subsequent section covers a detailed literature review to understand general strategies followed by companies from pharma and general sectors.

2.2 General Strategies Followed by Organizations

It is very important to understand different strategies followed by the organizations. In the current research, the researcher has reviewed various journals, books and other sources and compiled various strategies followed by different sectors including pharma companies. Before reviewing these strategies, it is important to understand strategic management and levels of strategies.

2.2.1 Introduction of strategic management

During 1970's, the term strategic management was first used hence the concept itself is not a new word to corporate world. Previously, a team of strategic managers used to plan strategic programs and sell ideas to decision makers. However, from 1990's onwards, the view towards strategic planning and management itself changed. The strategic planning slowly became a staff job and focused more on a process that requires the senior leaders of an organization to set its strategic direction (Denise Lindsey Wells, 2015).

To ensure successful performance of an organization, the management carries out specific moves and approaches for its business. The strategic management's strategies include a guide on how an organization conducts its business to achieve its target objectives. Without these strategies there is no cohesive action plan to produce the intended management results. The heart of a successful organization is their core management team that designs

and implements a strategy for successful business. Effective strategy combined with a powerful implementation remains cornerstone of any successful organization.

Strategic planning is essential for the future planning of an organization. The management can help its organization to improve performance by ensuring that the employees work towards achieving set goals. While doing so, the direction of progress should be adjusted as per the changing environment and based on the results obtained (Goodstein, L. D. & Nolan, 1992). Traditional planning has its own advantages and disadvantages; however, considering the change in the way the organizations work, strategic planning has gained lot of importance in recent decade.

The strategic management process creates strategies for accomplishing long-term objectives of an organization rather than getting involved in day-to-day operations (Jeffs & Chris,2008).

Elements of Strategic Management

The following are the four elements of strategic management (Figure 2.1). These elements help any organization to evaluate all aspects of business process so as to achieve its short, medium and long-term objectives. It is thus essential for an organization to follow the four elements of strategic management.

Figure 2.1: Elements of strategic management

Levels of Strategy

While strategic management gives the steps involved from concept to execution, it is also important to understand various levels of strategy and persons responsible for each level. A typical business firm should consider four types of strategies, which form a hierarchy as shown in Figure 2.2.

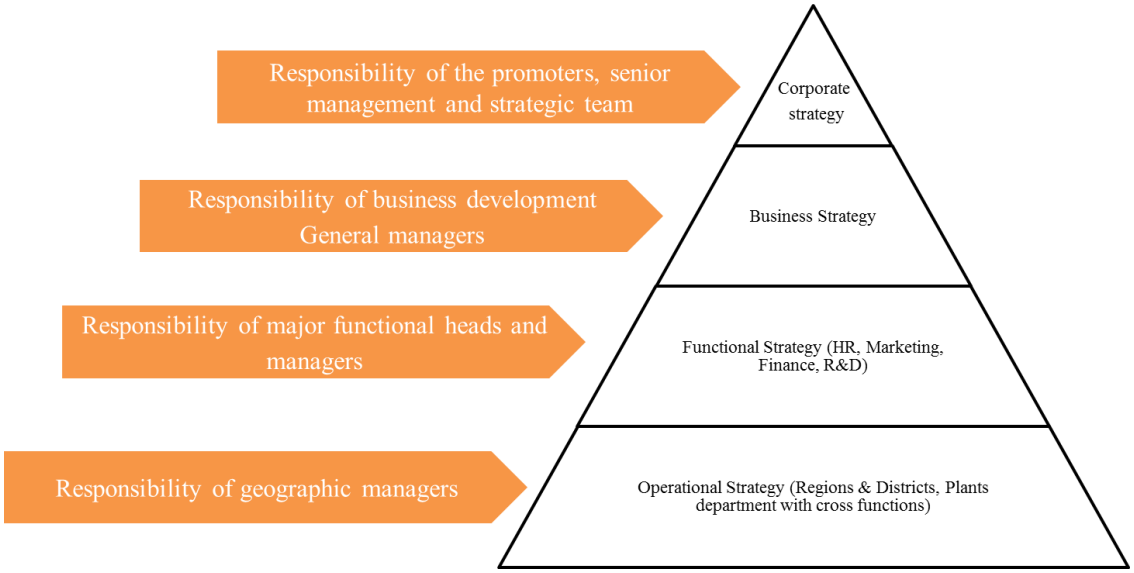

Figure 2.2: Hierarchy of Strategy in an Organization

Corporate strategy - Corporate strategy indicates company's overall path of progress by managing business and product lines – stability, growth, and retrenchment. For example, Coco cola, Inc., followed the growth strategy by acquisition. It acquired local bottling units to emerge as the market leader (Lomash Sukul & Mishra P.K, 2003). The nature of strategic decisions tends to be value-oriented, conceptual and less concrete than decisions at the business or functional level (Johnson, Gerry & Kevan Scholes, 2008).

Business strategy - To emphasize a unit or product's competitive position in an industry or market segment served by that business unit, business strategy occurs either at business unit or product level. Business strategy falls in the realm of corporate strategy. For example, Apple computers use a differentiation competitive strategy that emphasizes innovative product with creative design whereas ANZ Grindlays merged with Standard Chartered Bank to emerge competitively.

Functional strategy - It is the approach taken by a functional area to achieve corporate and business unit objectives and strategies by maximizing resource productivity. It is associated with developing and nurturing a distinctive capability for a competitive advantage. For example, Procter and Gamble spends huge amounts on advertising to create customer demand.

Operating strategy- is concerned on the way an organization delivers effectively the corporate, business and functional – level strategies in terms of resources, processes, and

people. They are at departmental level and set periodic short-term targets for accomplishment (Thomas L. Wheelen & Hunger J. David, 2002).

This hierarchy mentioned above is a standard practice in across the world and depends on nature of business, size of business, type of company it might vary. Companies listed on stock exchanges have a good and constructive approach in the implementation of strategies. For a strategy to be a successful one, it should be a top to bottom approach. Success purely depends on how effectively it is percolated to the bottom of the pyramid. Hence the top management and board should establish the need of a strategy, prepare a roadmap and core team to execute the strategy. Many pharmaceutical companies have successfully implemented various strategies but few find it difficult due to the complex nature of business.

The general strategies followed by companies depend on the target customers, competitive landscape, product portfolio, licensing requirements, market dynamics etc. However quite a few common strategies are practiced by most of the sectors. The literature review suggests the following strategies prominently observed in pharmaceutical industry.

2.2.1 Manufacturing strategy

Manufacturing is one of the key departments of any industry and adopting a right strategy would be a critical success factor for getting a product which is of high quality, uniformity, and cost effective. A detailed literature review will help to understand these factors as mentioned below.

Competitive Priorities

The main objectives of manufacturing process include cost, quality, delivery, and flexibility. As per Skinner, there were often tradeoffs between these processes (Figure 2.3). Essentially external objectives have survived the attention of numerous researchers to this day (Skinner, 1969). Researchers suggest that the basic four objectives can be tailored to the needs of an individual organization (Hill. T ,1993).

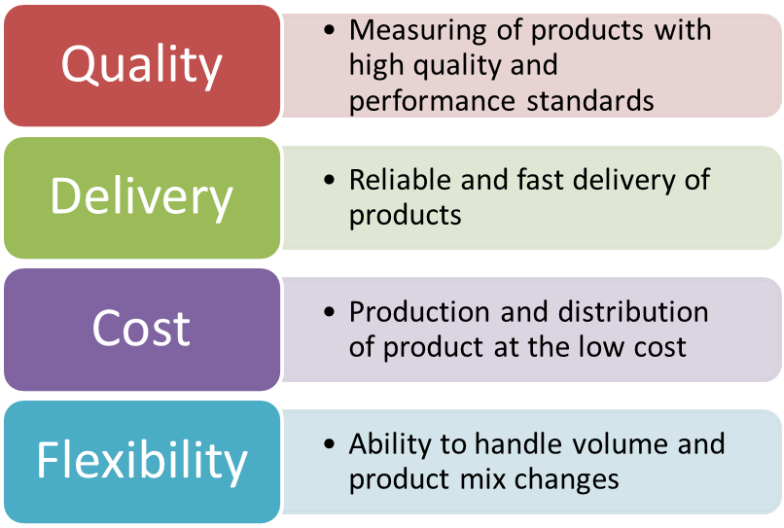

Figure 2.3: Major objectives of manufacturing

More precise is to rank requirements by relative weight (Fine & Hax, 1985). The approach leads to a composite set of priorities where the dimensions are ranked per importance to the competitive position of the company.

Quality - Quality is a multifaceted term and can be viewed from up to eight different perspectives – performance, features, reliability, conformance, durability, serviceability, aesthetics, and perceived quality (Garvin, 1987). In a manufacturing atmosphere, the "conformance" perspective is most powerful since it refers to produce products to their predefined specification reliably and consistently. Customer satisfaction is often regarded as the prime measure of external quality performance (Anderson and Sullivan, 1993).

Delivery – delivery reliability and delivery speed determine the overall performance of delivery. Delivery reliability often synonymous to on-time delivery is often regarded as a prerequisite (Menda & Dilts, 1997). Although, both delivery reliability and delivery speed are separate dimensions, long run success of an organization depends on speedy on time delivery (Ward, 1996).

Flexibility - Flexibility is regarded to be a multidimensional concept and is defined through – volume, variety, process, and material handling flexibility (D'Souza & Williams, 2000). Volume, mix, new-product, and delivery-time flexibility directly influence the competitive position of a company. Within existing manufacturing operations, the most influential types

are the ability to adjust manufacturing volume and the ability to change between products (Olhager, 1993(Hutchison & Das, 2007).

Cost - Cost is an absolute term and measures the amount of resources used to produce a given product. Researchers suggest that all producers, even if the primary source of competitiveness is different from product selling price, would be interested in keeping their costs low (Slack & Lewis, 2002). Every dollar removed from the operation's overall cost is a dollar added to the bottom line profits.

Manufacturing strategies in pharmaceutical context

Different collaboration models in manufacturing area are successfully used to reduce cost and increase pipeline and sales. Some collaboration models are as follows:

- ***Outsource:*** In this model, some functions are outsourced to vendors. Earlier, only non-core activities were outsourced, however, now-a-days core functions from value-chain (E.g.: manufacturing, clinical research, clinical trial management, marketing and so on) are also outsourced.
- ***In-license:*** In this model, the ownership to develop and/or manufacture products of the company is transferred to another company. Pharmaceutical companies adopt in-licensing strategy to close the gaps existing in their capabilities and requirements. This allows pharmaceutical companies to leverage its core competency and to develop/market the product quickly.
- ***Out-license:*** In this model, the ownership to develop and/or manufacture the products of the company is sold to another company. In out-license strategy; companies analyze limitation of the product. The company adopts strategies to maximize returns despite the constraints. Among these collaboration models, outsourcing model is adopted in the manufacturing business function, where either part or complete manufacturing operations is outsourced to vendor on contract (Pratik Kadakia & Jeffry Jacob, 2009).

During the complete development cycle of the drug, the manufacturing's requirements come at multiple stages. Therefore, companies adopt different manufacturing strategies for manufacturing outsourcing based on the stage of drug development, as the objective and business needs (such as volume, cost, time) are different in different stages of drug

development. In addition to this, companies also consider various others factors for outsourcing decision, such as products related risks, internal competencies & capabilities, cost of operations and others. Some manufacturing functions are completely outsourced, while some are partly outsourced (Yvon R. Tessier, 2006). The companies consider various key strategies for manufacturing as highlighted in Figure 2.4. Most companies prefer to adopt a hybrid approach (AT Kearney, 2005). Many companies that were evaluated in this research uses the model that suits business objectives of the company. Companies also consider de-risking the business processes and leveraging on the partner company capability.

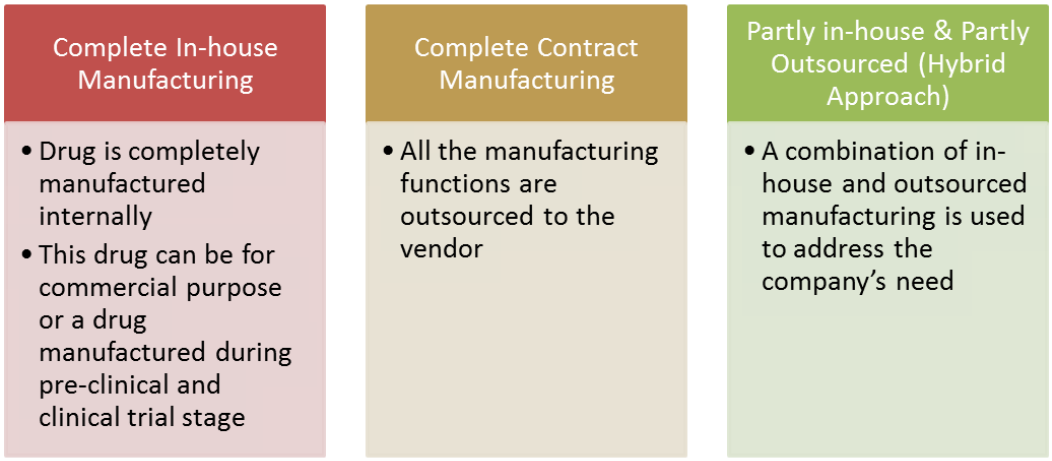

Figure 2.4: Key strategies for manufacturing

2.2.2 R&D strategy

Innovation brings a process of change in organizations and its market offerings. Innovation remains a key strategy that marketing team use to win over customers and markets and helps the company to gain sustainable competitive advantage (Nagasimha Balakrishna Kanagal, 2015). Various factors are associated with deciding on a brand and its positioning. Some of these include – product's attributes, unmet need, innovation, and perceived benefits such as cost-effectiveness and affordability. Pricing plays a key role in a products development decisions.

Research shows that apart from building brands, a good innovation also creates assents such as intellectual property (copyrights, patents, trademarks, trade secrets) and industrial designs. An ongoing innovation helps an organization to focus in building organizational capabilities along with the co-creation of value to the customer by adopting mind-sets, skills, behaviours, etc. (Prahalad & Krishnan, 2009). In pharmaceutical perspective, research and development of New chemical entity (NCE) requires lots of resources such as time (decades), cost (billions of dollars) and regulatory compliance. The number of new drugs approved has been flat and there has been a decline in number of approvals. Drop in NCE approvals from 1995 to 2005 is demonstrated in Figure 2.5 (Michael Hu, 2007).

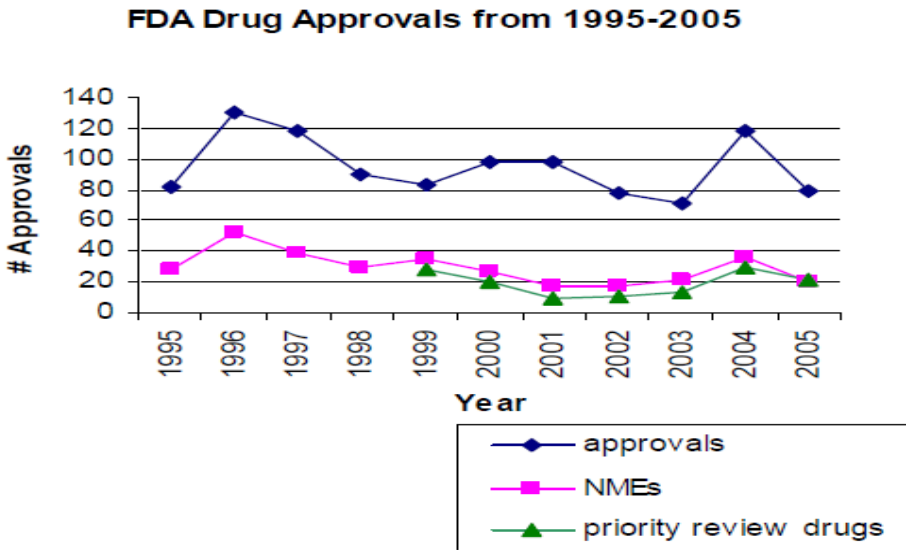

Figure 2.5: FDA drug approvals from 1992 to 2004 (adopted from Michael Hu, 2007)

As per (DiMasi M et al, 2003) R&D expenditure to develop a NCE was around 800 Mn USD in 2002. Figure 2.6 demonstrates the total expenditure on pharma R&D has been on increase and it is very evident when compared with 1992 where the total spends was just 15 Bn USD and in 2004 it was 40 Bn USD.

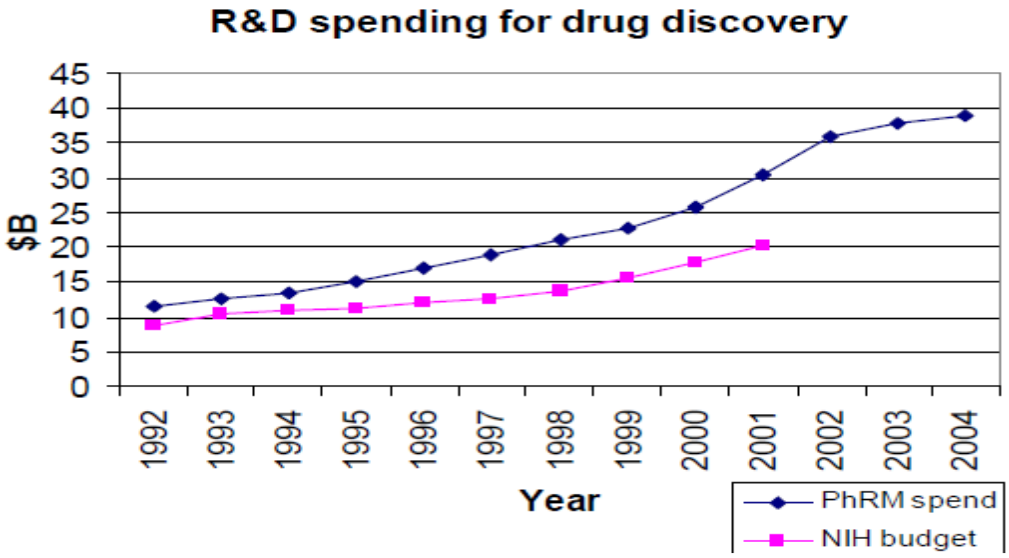

Figure 2.6: R&D spending for drug discovery (adopted from Michael Hu)

In this scenario pharma companies evaluate many R&D strategies like co-development, out-licensing and in-licensing to overcome the challenges mentioned above. For example, Dr Reddy's Laboratories out-licensed under development NCE to Novo Nordisk and Novartis.

2.2.3 Product strategy

A) Product strategies in general context

Products bring business and help a company build and establish brands. Product strategy plays a crucial role in current competitive scenario. Innovative/distinguished products find it easier to enter a new market and gain maximal market share compared to other products. Mere creating 'something new' or 'something different' does not suffice. The product should be able to fulfill an unmet need and should meet the needs of a customer base. Product innovation could thus be the creation of a new market or an addition or an extension/modification to the product/process/technology in the existing market or with the creation of new competitive space (N B Kanagal, 2015).

1. Dual extension
2. Product extension
3. Communication extension
4. Dual adaptation

1. **Product adaptation; Product/Communications Extension (Dual Extension) -** In this model, a company extends the same home-market product and promotes into a target market. It can be the simplest and most profitable strategy is applied well. This strategy is best suited for companies that use a global strategy; upscale personal items with global brand names and are low-cost leaders in their industries. The utilization of one product and one promotional message keeps costs down (Warren J Keegan, 1969).

2. **Product Extension; Communications Adaptation –** In this model, the company extends the same product into new target markets, but alters its promotion. The communication to the product is adapted to the market since the product fulfills a different necessity, serves a different function, or appeals to a different type of buyer. Although the product does not undergo any alterations, developing customized promotional campaigns and communication strategy is expensive (Warren J Keegan, 1969).

3. **Product Adaptation, Communications Extension -** In this model, a company retains its original marketing communication and adapts its product as per the need of the market in which it is launched. Several reasons such as legal necessitate the need for adapting the product to the new market. For example, the government might have made compulsory for the new entrant companies to utilize the local materials, labor, or other resources in the product process. In case, the original product does not contain these materials, it has to be modified to meet the local/legal needs. Generally, companies implement this strategy/model in cases when they sell differentiated product and charge higher price to beat the increased product expenses (Warren J Keegan, 1969).

4. **Product/Communications Adaptation (Dual Adaptation) –** As the name suggests, it involves a dual adaptation where the company adapts both the product and its marketing communication to suit the target market. This is a very high cost affair for the company and can be executed only if a large and profitable market segment exists.

B) Product Strategies in pharmaceutical Context

In pharmaceutical context, a product is one that cures a disease or improves condition of a patient (Ahmed, R.R. and A. Saeed, 2014). There are two categories of pharmaceutical products - Prescription products and over-the-counter (OTC) products (Lam, Michael D., 2004).

Prescription Drugs - The prescription drugs are the ones that can be brought only through prescription of a registered medical practitioner. A person without medical and pharmaceutical knowledge cannot decide on the right drug needed to cure or mitigate a disease condition. Generally, this category of products consist of single ingredient preparations and packaged in professional language not so easy to be deciphered by layman (Wolfe, S.M., 2002).

OTC Products - These products could be purchased at the counters without the need of a prescription. These are generally low-risk medicines such as vitamins and minerals, nutritional supplements, some cough syrups and pain killers/balms. In some countries, the pharmaceutical companies are allowed to market these products directly to their customers through mass media (Drugs and Pharmaceuticals, 2004).

C) Product line and product mix decisions

An ideal product portfolio should be carefully designed to meet the market demand, customer need, product development capability, and manufacturing infrastructure. If any one of the above factors does not support then the chances are very low for product's success and sustainability.

D) Product Line Decisions

A product line is a group of products that deal with the same disease condition or is promoted to the same segment of the medical profession. For example, 3-4 brands of a company all perform the same function (e.g. blood pressure reduction through different mechanism of action) but with different price points (Tomlinson, H., 2004).

E) Product Mix Decisions

- A product mix or product consists of all the product lines and items that a company has to offer. A company may have a range of different categories such as antibiotics, painkillers, cough syrups, antidiabetics, antihypertensive, etc. All these put together would form a product mix (Prathap and Micheal, Vikalpa, 2005). A company's product mix has four important dimensions

a) **Width**: Product mix *width* refers to the different product lines a company carries; e.g. GlaxoSmithKline has a wide product mix consisting of antibiotics, painkillers, multivitamins, dermatology products and antiulcer agents

b) **Length**: Product mix *length* refers to the number of items a company carries in its product lines. SKB has Fortum, Augmentin, Ampiclox and Ampicillin in its antibiotics category.

c) **Depth**: Product mix *depth* refers to the number of versions each product offers. SKB's antibiotic brand Fortum comes in 250 mg, 500 mg and 1 gram and similarly the other brands are also available in different strengths.

d) **Consistency**: of the product mix refers to how closely related different product lines are. In case of SKB, it is an inconsistent product line, but the company successfully manages it due to immense resources and elaborate infrastructure.

2.2.3 Pricing strategy

Pricing a product is a complex issue in any market. Companies must embrace strategic product pricings in order to sustain in the globalized world because price is the best weapon. In order to face stiff competition and to maintain continuous growth, pricing the product is tangled considering all the characteristics that affect them. Below are some of the general pricing strategies adopted by different sectors of the industry:

Differential Pricing Strategies

- ***Second Market Discounting -*** This pricing strategy is much related to the opportunity costs that a company may face. This fact is explained by the existence of fixed costs that are independent of the sales, so they must be covered. Every cent that overpays the variable costs is a profitable one (Rui de Carvalho, 2010.)
- ***Negotiated price discounts*** - The market approach outlined above can be combined with the negotiation of price discounts between buyer and seller. The contracts and their terms can be either less transparent or presented in such a way as to minimize the risk of such discounted prices having repercussions on the acceptability of prices in the high price markets. A degree of moral suasion exerted by international public opinion can also influence the terms of such contracts (Jayashree Watal, 2001).
- ***Random discounting -*** The strategy known as random discounting has a lot to do with customer search and its search costs. The main objective of this type of discounting is to discriminate customers buy its cost of search for a different price. Some customers (known as informed customers) are more rationale and more price sensitive, so they will perceive their benefit of finding a lower price as much superior when comparing to the time they spend looking for an alternative. Secondly, there are customers (uninformed customers) who are insensitive to price or have less time for shopping and hence buy the product they see (Rui de Carvalho, 2010)

Competitive pricing strategies

- ***Penetration Pricing-*** Penetration pricing consists of setting an initial price lower than the one of the market in an effort to breakdown the purchasing habits of the customers and obtain a larger market share. This type of pricing strategy reduces cost reduction pressures and discourages entry of competitors (Alexandre Dolgui, Jean-Marie Proth 2010).
- ***Experience Curve Pricing-*** Companies with good experience of industry plan this type of strategy in competitive markets with price sensitive customers. A market leader will usually have greater demand for its goods and services than its competition. This strategy allows a company to decrease its prices resulting in increased competitive advantage (Rui de Carvalho, 2010)

Product Line Pricing Strategies

- ***Price Bundling -*** Price Bundling is a part of product line pricing strategies. This is used when a firm is in front of heterogeneity of demand for non-substitute perishable products. It is easy to be broken out with different perceived value for more than two products. For example, a firm produces product A and B. The firm selects high prices as much as they can sell, then make bundle to maximize more profit for customers who want to buy both products when perceived values by consumers were different (Rui de Carvalho, 2010.)
- ***Premium pricing-*** Premium pricing is employed for selling unique and very high quality, but to sell a small amount. Buyers of such products typically view them as luxuries and have little or no price sensitivity. The advantage of this pricing strategy is that you can price high to recoup a large profit to make up for the small number of items being sold (Sarah A Roth, 2007)
- ***Image Pricing-*** A Company can bring out an identical version of its current product with a different name and a higher price. The intention for using this strategy is to signal quality of products. There is a strategy between price signaling and premium pricing (Rui de Carvalho, 2010)
- ***Complementary Pricing-*** Complementary pricing used when a range of products or services complement each other and can be packaged together to reflect increasing value. This pricing strategy is like multiple pricing strategies. However, rather than purchasing a greater quantity of one item, the customer purchases a different item or service at a higher price that is still perceived as a value when compared to the price for the individual product or service. In addition to selling each of these items individually, a gift box is used that packages one of each item together. The price for this gift box would be slightly less than what a customer would pay in total when purchasing each of the same items individually (Sarah A Roth, 2007).

Pricing strategies in a pharmaceutical context

Global pricing strategies are defined by effective responses to the constraints on international pharmaceutical prices resulting from different reimbursement and reference pricing systems. Both the marketing and R&D departments of the company could

contribute significantly to help an optimal pricing strategy. R&D strategies include the choice of comparator and target profile, use pharmaco-economics, integration of pricing into portfolio management processes and support of ongoing negotiations with reimbursement bodies and other payers (Steven Seget, 2003).

A) **Reimbursement and Pricing -** Pharmaceutical product revenues are dependent on a variety of factors, including price, reimbursement status, therapeutic benefits, and the degree of competition. Depending on a product's likely reimbursement status, there are several potential strategies, either to increase the likelihood of gaining increased reimbursement coverage or to maximize revenues at a given reimbursement level. In cases where a product is unlikely receive reimbursement status (e.g., for lifestyle drugs), companies may gain more from launching the product outside reimbursement at a higher price than is otherwise possible. In this case, it is particularly important to raise awareness of the disease and, if possible, of the brand amongst patients and physicians to achieve sufficiently high prescribing levels in the face of a smaller population likely to be able to pay for the product. In the US, drugs with no or partial reimbursement can benefit from DTC marketing to patients. In the EU, however, this is not an option. Instead, there are two major alternative marketing strategies, which can also be used for partially or fully reimbursed products to increase revenues. If there is no chance of a product gaining reimbursement status, its marketing company may consider launching an OTC version to access additional revenue streams. Alternatively, if the condition is the target of government funded programs, such as antismoking campaigns, companies can promote their product to consumers as part of patient programs (IMS Institute for Healthcare Informatics, 2014).

Unlike other sectors, the pharma industry has to face lot of challenges to fix the retail price. In most countries, there is a price cap on the pricing. This will have direct impact on the marketing campaigns and brand positioning.

B) **Government Intervention in Pricing -**Government intervention in pricing is a controversial topic and many market economists feel strongly that the market should

be left to its own devices (Ruth Lopert, 2002). Some of the key factors are discussed herewith.

- ***Price controls on the Manufacturer*** – In these cases, the government restricts medicine prices to the cost of production plus a profit margin.
- ***Reference pricing and Brand Premiums***-The reference pricing mostly remains a benchmark price and does not necessarily become the market price for all the medicines in the same therapeutic class. Manufacturers may place the cost of their products to a higher range; however, they need to compete against equivalent, lower priced products already in the market. Branded premiums are often used in conjunction with reference pricing. They are used when the third party comes into scene during the co-payment.
- ***Fixed Margins***-These margins are a fixed percentage of the wholesale price. Problems include the tendency for pharmacists to negotiate rebates and other discounts directly with the wholesalers that is not passed on the consumer. In some countries, these discounts are illegal.
- ***Capitation systems***-The pharmacist is reimbursed with a fixed sum based on the number of patients per year or a fixed fee per prescription. Goal is to keep pharmacists from benefiting from either the price or volume of units dispensed.
- ***Eliminating Tariffs and Taxes***-The sizeable price increase can occur through the out of supply chain in the form of tariffs and taxes. Though taxation increases revenue in low-income countries, it leads a negative effect in the Health systems.

Factors influencing Pharmaceutical Prices and Total costs

Multiple factors influence pharmaceutical prices and total costs. Some of these factors are:

- Competition
- Regulatory system of the country
- Patent status/ IPR pathways
- Selling expenses
- Reorder frequency and the total cost of purchases
- Visible and hidden costs
- Unit prices

Companies must embrace strategic product pricings in order to become successful in the domestic and global markets. Price is the best weapon used in the pharma industry, it helps in penetration, and gaining the market share immediately compare to other general strategies discussed. However, pricing strategy should be is carefully designed to meet short-term and long-term objectives of the company. An incorrect pricing is bound to be counterproductive and may result in huge failure of the entire strategy. In some cases, the product even fails to take off.

2.2.4 Marketing and sales strategy

Marketing and sales strategies play important role in building a company. This is the era of marketing and companies are successful in marketing the products and building brands for successful and sustainable business. Effective marketing and sales strategies helps the company to generate sales and profits. Below are some of the marketing and selling practices followed by all the sectors including pharmaceutical industry:

i. Direct Marketing

Direct marketing allows companies or brands to communicate directly to customers through mass media—print, digital and online (Ogilvy, 1989).

ii. Advertisements

Advertising employs an openly sponsored, non-personal message to promote or sell a product, service or idea through audio/visual means (Bovee, 1992). Advertising encompasses several aspects (e.g., placement, timing and content) based on regulatory requirements of targeted country. For instance, advertisements related to alcohol are not allowed on TV after 9 PM, this type of advertisement is totally banned in Sweden and Norway.

Some of the general types of advertisements are (Sandage & Rotzoll, 2001)

a. **Brand advertising** – it is usually visual and textual advertising intended to achieve a higher level of consumer recognition of specific brands
b. **Commerce and retail advertising** - This form of advertising is used by a manufacturing or marketing organization to focus on specific product or service

c. **Political advertising -** one of the most prominent and the most influential types of advertising that helps in forming a positive image of a politician
d. **Advertising with a feedback** – Opinion sharing on service or product remains the main objective in this form of advertising
e. **Corporate advertising** - The message of this advertising is simple and usually in conventional word often targeted to dwell the message down the line to customers
f. **Business advertising-** A professional oriented advertising intended for distribution among the targeted groups formed by them.
g. **Public or social advertising** - Unlike business advertising, it is oriented to the audience, united mainly by people social status - for example, single mothers, childless couples, teenagers, etc.

iii. Personal selling

Personal selling is an oral presentation in a conversation with one or more buyers to make sales (Achumba, 2000). Firm's sales team usually does personal selling to the targeted customer confining itself to few segments. The major benefits of personal selling are face-to-face interaction, persuasion, flexibility, promotion of sales, supply of Information for mutual benefit

Types of Personal Selling

Personal selling is of four categories (Achumba, 2004) (Osuagwu, 1999) in which all of them follow same methods but have different objectives. The four types of personal selling are:

a. **Trade selling** - providing promotional assistance to intermediaries to promote firm's products.
b. **Missionary selling**- allowing intermediaries to use good will of the firm's product
c. **Technical selling** - creative selling involving sales team for promotion
d. **New business selling** - finding out new opportunities for selling which is slightly difficult thereby requiring skilled and experienced staff

iv. Sales promotion

Sales promotion is a tool used by a manufacturing firm to boost the sales of its intermediary or retail unit ultimately driving the numbers E.g.: temporary price reductions.

vi. New Technologies

Retail sector has many new opportunities with latest technologies (Karen Gedenk et. al, 2005). Below are some of the new sales strategies followed in retail sector

a. ***Loyalty cards*** – Loyalty cards have been used by retailers for quite a few years by attracting customers to its stores by offering attractive promotional offers like payback points that can be redeemed for specified value of goods thus boosting the firm's sales. E.g.: Metro in Germany promotes Payback loyalty program.
b. ***Personal Shopping Assistants***- Personal shopping assistants (PSAs) are linked to any loyalty card having shopping history giving a broad picture of purchasing habits. E.g.: Metro store uses Payback loyalty cards that display the shopping history, savings from the discounts etc.
c. ***Electronic Shelf Labels and Advertising Displays***-These are controlled by WLAN and are connected to price administration system, checkout system to have uniformity. E.g.: Metro future stores in Germany
d. ***Radio Frequency Identification (RFID)*** **–** Utilizes radio waves to identify physical objects. E.g.: Walmart uses RFID.

vii. Public relation

Public relation deal with communication events designed to instill and preserve an organization's image and relationships with the public. This form of communication is used to increase the relationship of firm or its products with consumers (Bush M, 2009) and is generally achieved through the following ways

a. **Direct mail:** Sending of publicity material to a named person that has seen tremendous growth (11.8%) over the last 5 years **(**Royal Mail, 2000**).** Maintaining the database often demands more investment in this form of promotion.
b. **Personal selling:** Selling product directly is very effectively practiced in FMCG industry. (Porter, M.E, 1980).

viii. Marketing and sales strategies in pharmaceutical context

Due to nature of the profession, products, its effects and desired side effects there are restrictions in sales and marketing techniques when compared to other products. Pharma is one of the most regulated sectors and over the period of time, pharma companies have developed many customized marketing and sales strategies.

In pharma industry, doctor or pharmacist is the direct customer and benefits of a drug are passed onto patient or customer through a channel of retail pharmacy and distribution. Medical or sales representative create sales of a product through effective marketing strategies and a patient purchases product from retail pharmacy. However, patient can directly purchase OTC drugs from a retail pharmacy. Companies formulate marketing strategies for retailer and distributors for OTC drugs. The basis of marketing strategies can be best described through two models: (Saurabh Kumar Saxena, 2007)

a. **Super core model –** This is often targeted for chronic therapy area involving sales of small quantities of drugs from large population. The chronic therapy often gets the orders repeatedly from the same targeted population for longer time and any addition of new consumer becomes added advantage. Maximal profits due to high cost of drugs attracts many players. Oncology, neuropsychiatry, cardiology products belong to this category.
b. **Core model** – It is used to promote acute therapy area in diversified markets and large quantity of drugs. Aggressive promotional strategies such as reminders form the backbone of this form of marketing. E.g.: analgesics, gastroenterology products

In pharmaceutical market, there has been a significant shift from acute towards chronic therapy area due to high growth rates (E.g. Sun Pharma, Dr Reddy's Labs). This has further resulted in finding out the hidden potential therapies E.g. Oncology, Biologics. The shift of focus from acute to chronic therapy resulted in mergers and acquisitions of companies, rearrangement of medical representatives, and aggressive promotional plan with high investment, or more field force on board. These aggressive promotional plans with skilled medical representatives, differentiated product portfolio influence the prescribers and

PULL them towards brand often termed as PULL strategy i.e. from Doctor to Retailer to Stockist to CFA to company. On the other hand, few companies have been focusing more on availability of products to create a good perception of company in their customer's mind (E.g. Cipla, Glaxo, Pfizer etc.). These companies achieve this by having more number of medical representatives on board and more product schemes to PUSH their products to distributor and retailors (PUSH strategy i.e. from to Stockist to Retailer to Doctor).

Advertising and promotion strategies

- **Marketing:** OTC pharmaceutical products require more field force to remind their direct customer (doctor) of their products on regular basis. Maintaining good rapport with distributors and retailers has compelled pharma companies to hire more and more sales representatives ultimately pushing products by increasing touch points to prescribers and chemists. This method sometimes forces physicians to avoid a sales call by medical representative. A successful product should be promoted with a right mix of promotion i.e. both PUSH and PULL strategies.
- **Sales promotion:** Sales promotions are commonly used to obtain an increase in short-term sales with various promotional strategies. E.g. OTC business offering special discount coupons (Kotler, P. & Keller, K.L., 2006)

2.2.5 Geographical expansion strategy

It is very important for an organization to look beyond the home turf to leverage its products and capabilities. In an era of globalization, products and services move across borders to increase revenues and gain popularity worldwide. In modern era, companies adopt many tailor-made expansion strategies depend on product, demand and regulations.

There are four generic strategies followed by companies to expand in global markets viz, International strategy, Multinational strategy, Global strategy, and transnational strategy.

i. **International strategy -** In this *strategy,* based on opportunities, challenges and operating environments, the respective resources/assets are allocated for various types of activities from development to sales and services to achieve multinational strategic objectives. The firms following this strategy often develop customized products and

marketing mix to match respective regulatory requirements. E.g. Philips, Unilever, Nestle have different approaches in different countries. This type of strategy reinforces company's willingness to delegate more operating independence and strategic freedom to its foreign subsidiaries (Oliver Furrer).

ii. Multinational strategy- National differences form the basis of achieving objectives in multinational strategy. In multinational strategy, organizations adopt a more flexible approach and carry out the operations by minor modifications of both products and marketing strategies as per the country's requirement, consumer preferences, industry features and legal requirements.

iii. Global strategy - Due to the limitations of Multinational strategy like inefficient manufacturing infrastructure in various markets, some companies follow Global strategy in which these companies (e.g. most of Japan Companies) produce products as per global standards through economic scale and economic scope. Scale efficiency is used as a competitive tool primarily because it has the potential to yield reduction in production costs by spreading the fixed costs over a higher volume of output. Further cost reduction from scale arises from the learning curve effect (Lieberman, 1984) (Pattison & Teplitz, 1989). This method also facilitates improved efficiency of local working force thereby saving costs across functional units. Economies of scope exit when "it is less costly to combine two or more products lines in one firm than to produce them separately" E.g.: Sony for TVs, Mobiles, etc. (Panzar & Willig, 1981).

iv. Transnational Strategy- In today's dynamic marketing scenario, customers strengthen local forces by rejecting standardized global products and reasserting to the national preferences (Holt & Douglas B, 2004) forcing many multinationals. In transnational (Ghoshal & Bartlett, 1998) strategies companies work to fulfil local needs while retaining their global efficiency. e.g.: Coca Cola

Internationalization strategies in pharmaceutical context

Globalization has replaced the word internationalization as per (OECD, 1994) and refers to a developing pattern of international business cooperation. This cooperation could be through investments, trade and targets the development of products, production, procurement and marketing enabling them to conquer new markets with their technology.

These multinational companies often come with strong strategy, good market position, global integration connecting their performance, flexibility in purchasing management strategy. Pharmaceutical companies tend to internationalize and globalize their business activities sooner than in the past, due to various trade and establishment benefits. Today companies prefer to go for internationalization and global alliances in order to be closer to customers, increase organizational effectiveness, gain better access to technologies and know-how, protect them from competitors.

Researchers believe that intensive globalization process influences concentration and consolidation in global pharmaceutical industry, which is becoming more oligopolistic and tends to be even more monopolistic in future due lack of product and global fight for market shares. Based on these findings, it is speculated that in future only three major groups of world pharmaceutical companies would prevail:

- Huge-mega inventive pharmaceutical companies
- Transnational generic companies and
- Focused specialists (biotechnology, pharmacogenomics)

2.2.6 Summary

General strategies as reviewed in this chapter are followed by every company irrespective of their sector. Top Indian pharma companies evaluated in this chapter have successfully implemented these strategies and have successfully gained market share, expanded operations across the world and moved to leadership position in India and globally. Because of vertical integration from development and manufacturing to commercialization they have built a sustainable business models.

However last decade has seen the intense competition in global markets from companies of developed countries like North America and European Union. These companies are in the forefront of inventing new technologies to protect their market share and to put an entry barrier to Indian and regional generic manufacturing. These companies are effectively utilizing digital technologies for overall success. In the next chapter, a detailed review of the digital strategies has been attempted.

2.3 Digital Strategy

2.3.1 Introduction and background

Countries globally are increasingly becoming connected, world is becoming smaller and flat (Srivastava RK, Thomas GM, 2015). Autonomous innovation and customized digitalization is essential for an organization's sustenance in the current era. The current digital era could be divided into 4 phases - internet era (mid 90s), social media (mid 2000s), collaborative economy age (now) and autonomous world age (emerging). The world is moving fast from current collaborative economy to an autonomous world age. The autonomous world would for sure be powered by intelligent technology systems that would operate with minimal human intervention one hand and enable new business models for a more efficient society on the other (Owyang J, 2016). With a collaborative economy and autonomous world age, a 3rd platform built on the foundation of cloud, mobile, social and big data technologies has been defined in the digital space (Gens F, 2013).

Since the beginning of 21st century, the word digital has fundamentally changed our lives. In a typical minute, today more than 204 million emails are sent, 571 new websites are created, 17,000 online consumer transactions are conducted with Walmart, 15,000 tracks are downloaded on iTunes and 2 million Google searches take place (AT Kearney, 2015). Of today's estimated 3 billion internet users, more than 1 billion exclusively use mobile devices. During the last decade, technology has played crucial positive changes in marketing world. The pharmaceutical marketing has not left untouched from the impact of digital revolution. With changing consumer and physician media preferences and shrinking marketing budgets, the change in pharmaceutical marketing is inevitable.

Introduction: What is digital strategy?

The Oxford dictionary defines strategy as "a plan of action designed to achieve a long-term or overall aim". Thus, the why and how of a task define a successful strategy as illustrated in Figure 2.7 (Bradford C, 2016). Although, the implementation of a digital strategy concentrates mostly on utilization and application of new technologies to existing set up, digital strategy is not same as IT strategy and altogether requires a different approach. In

addition, the role IT infrastructure is indispensable for the success of overall digital strategies (McDonald M, 2015).

Figure 2.7: The definition and flow of a strategy (McDonald M, 2015)

At a very high level, digital strategy involves two options. The first option covers the path taken for covering up the new functions and processes. For instance, the path it took while automating and integrating functions across the organization starting from ERP, CRM, supply chain, sales force, product development and other functions. Examples of strategies based on including new tools and technologies to the existing activities and processes include – digitalization of human resources, financial and project management. Transformation of business through planned activities happens to be the second option for digital strategy. To sum up, "digital is the application of information and technology to raise human performance". For a business to be successful, digital strategy needs to be the essence of business strategy (The economist, 2015).

Prerequisites of digital strategy

The implementation of any digital strategy depends on four main core factors – devices, networks, technical capabilities and platforms and services as illustrated in Figure 2.8 (Kurt Salmon, 2014).

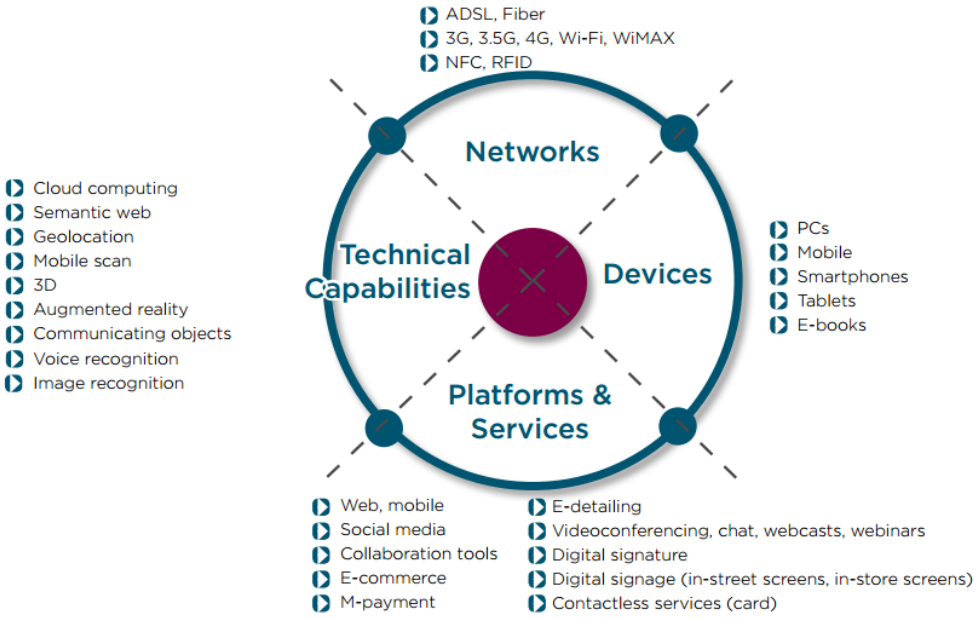

Figure 2.8: Core factors for implementing digital strategy (Kurt Salmon, 2014)

2.3.2 Digital era evolution

- **Pre-digital era**

The pre-digital era was characterized by simple life. During this era, even the most automated devices performed just one function. For example, a telephone could just receive and make calls – the main function of telephone. The media was in physical form and technologies lived parallel to each other without having any possibility of interacting with each other. The retail market was characterized by either in-store or home shopping. Things changed slowly as we moved from Video home system (VHS) to digital video disc (DVD), cassettes to (compact disc) CDs. The companies slowly started direct marketing, however, this did not change the so-called retail landscape, or logistics supply chain. The rights and intellectual property rights stayed where they originally belonged. One important characteristics of pre-digital era was the scarce information. The companies were often planned around their production and products. The demands were stocked as per then advertising and marketing which mostly happened through manual means (Goodwin T, 2016).

- **Mid digital era**

The pre-digital age evolved slowly with a change in ecosystem of business. Products started digitalized slowly, photos became bits, knowledge slowly started moving from encyclopedias to Wikipedia, the phone became an online directory, and printed magazines became websites. The mid-digital era was characterized by the digitalization of physical products and use of digital technology slowly led to creative destruction in retail, manufacturing, and distribution. The mid-digital also had impact on the copyrights and intellectual property rights, for example, restricted viewership in TV channels. Some part of content available only in some countries. TV watching became just little more selective, the user had to select the input device then channel rather than just navigating to the show. Marketers whose focus was to deliver advertisements and medium rather than content loved TV. The advertisers and marketers decided where and how their advertisements were served. Cards were accepted by businesses. Retails stopped accepting collection or exchange of goods purchased online. The retail business had real difficulty and competition from the online players such as Amazon and eBay (Goodwin T, 2016).

- **Post-digital era**

Technology would dominate post-digital era. Technology as evident from today's scenario would be a quiet element forming the backbone of day-to-day life. Internet and mobile technology would be essential for everything. Internet and mobile would become a background utility, noticeable only in their absence! The concept of smart homes, smart devices would be reality – all seamlessly and effortlessly (Goodwin T, 2016).

The Internet of Me is changing the way people around the world interact with the help of technology, placing the end user at the center of every digital experience. As everyday news and objects are going online through digital channels to reach deep into every aspect of individuals' lives to create a great real-time experience. Forward thinking businesses are changing the ways companies adopt to build new applications, products, and services. To gain control over these points of accesses, companies innovate ways to create highly personalized experiences that engage and exhilarate consumers without breaching

customer's trust, security and privacy. Those companies that succeed in this new "*Internet of Me*" will become the next generation of household names globally (Accenture, 2015).

Technology and digital strategies

Applying new technologies to the existing products and services, practices and processes has become inevitable with majority of population worldwide adopting digital technologies. Change in trend mobile, creating customized dashboards, adding analytics have all extended the online experience for the right audience on a real-time basis. Although, adopting these technologies has allowed limited change to the work function, they have for sure changed the form of interaction often in favor of the company or product. Adoption of digital technologies and creating a strategy right for the organization could be achieved in two ways: (Bradford C, 2016)

- **Upgrading the current digital platforms**: This could be accomplished by upgrading the existing digital and online platforms to accommodate new functions and processes in a phased manner. Starting with the enterprise resource planning (ERP), customer relationship management (CRM), supply chain, sales force and product development, digitalization could be achieved based on the organization's requirements. The other functions such as human resource, training and financial management should also be upgraded as per the latest technologies.
- **Transforming activity and business**: Experience changes understanding of the customer with the adoption of digital technology. The major advantage of digital technologies is that they do not change people but enhance their ability to achieve goals with the speed of information. The success of digital technologies depends on integration of various departments using various tools. For example, mobile, cloud, process, customer, supply chain, cannot function in isolation, they should be integrated and automated to give desired outputs as dashboards at appropriate levels.

Advantages of digital strategies

An ideal digital strategy framework could help companies to complete projects on time with desired expectation. One of the major advantages of digital strategies is that, each

stage or phase of implementation is transparent and measurable. Each and every step could be monitored to ensure that desired goals are achieved (Harrison, 2015).

It was found that, value addition occurs when existing IT infrastructure of an organization is revamped with newer technologies aligning to business goals as illustrated in Figure 2.9 (Hinchcliffe D, 2014).

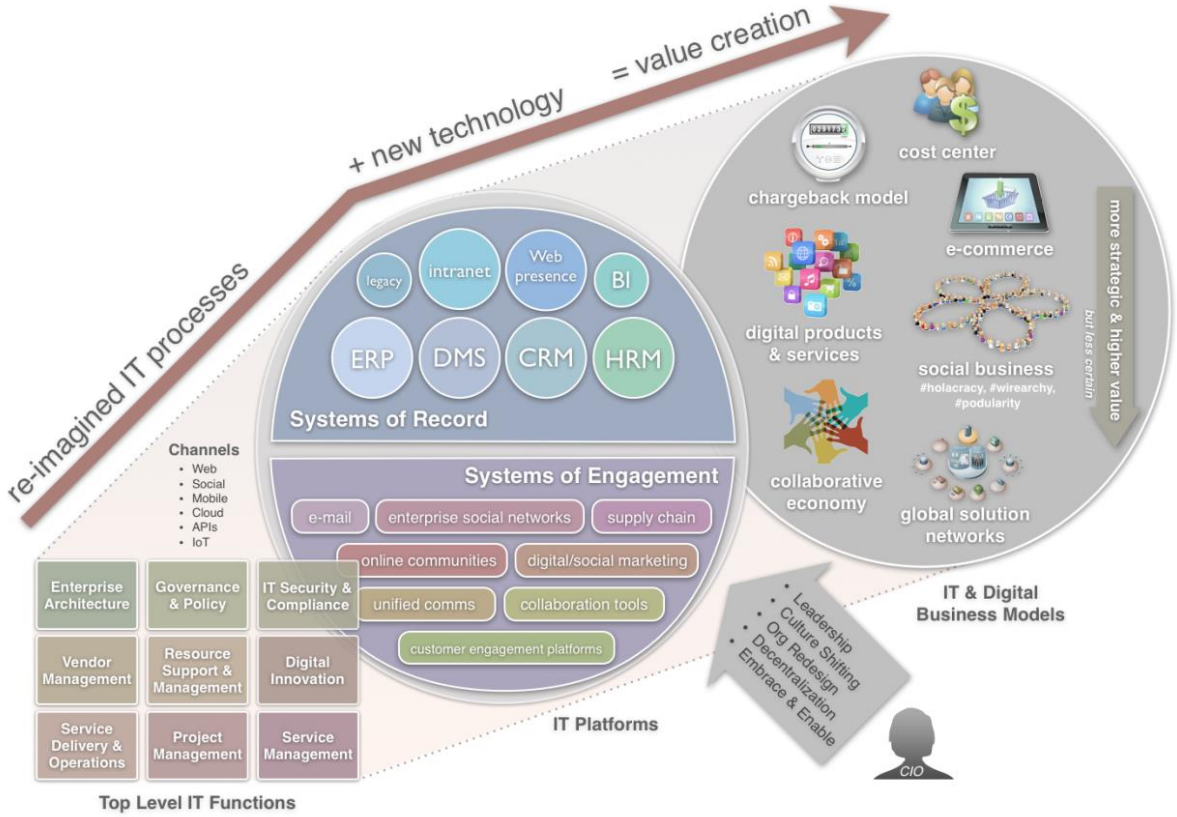

Figure 2.9: Building a 360° ecosystem through digital technologies (Hinchcliffe D, 2014)

It is obvious that thinking of digital is the first step in reshaping every aspect of the modern enterprise. An effective implementation digital strategy is possible only when the full impact of digital on the entire organization and its processes are taken into account while developing the digital strategy. The key success of a digital strategy depends on customization of tools meeting the company's needs and goals (Harrison, 2015).

2.3.3 Future of digital era

Industry 4.0/the Internet of Things (IoT) and the Internet of Services (IoS) will improve operational processes and for example, offer mobile solutions for employees, clients and suppliers. Every aspect of work-life would be connected to digital technology as illustrated in Figure 2.10. Additionally, big data analytics would enable real-time data driven decision making (Ralf Dillmann, 2015).

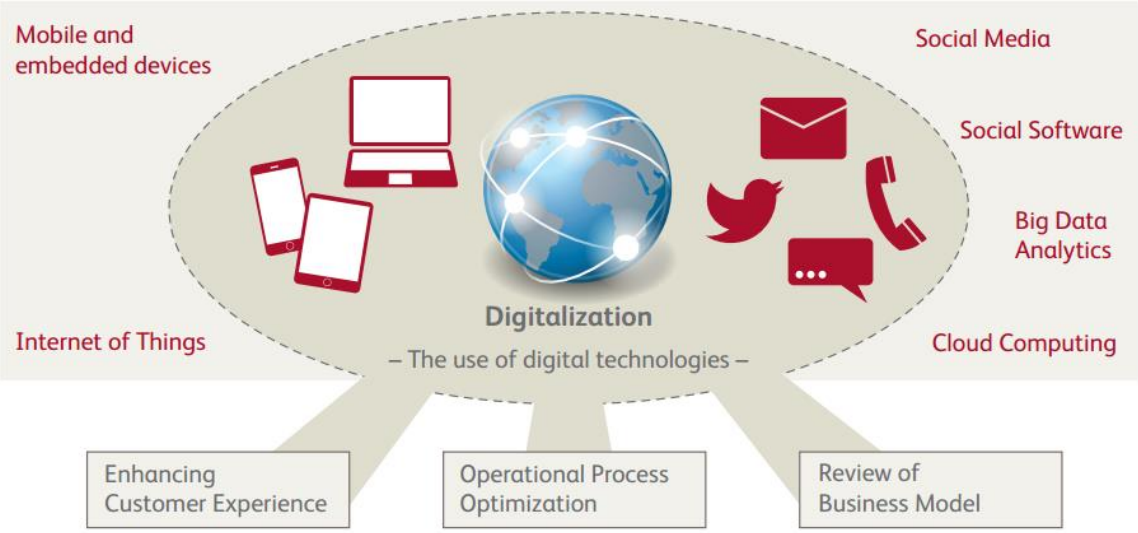

Figure 2.10: Future of Digitalization (Ralf Dillmann, 2015)

As per (Mc Kinsey&Company, 2015) report there are a number of disruptive technologies that will evolve and enable digitization of the manufacturing sector as mentioned below:

i. **Data, computational power, and connectivity**

   This cluster, comprising of big data, IoT, and cloud technology, mainly driven by cost reductions that makes ubiquitous use of sensors and actuators possible and allows for affordable yet powerful storage, transmission, and data processing. For example, in IoT, sensors and actuators embedded in physical objects are interconnected via wired and wireless networks and to churn out large volumes of data that flow to computers for analysis. As the technologies evolve and utilize IoT to a greater extent, this technology would become more and more affordable (Mc Kinsey&Company, 2015).

ii. Enhanced product development

IoT assists companies with insight into factors such as consumer preferences and product usage. This information can be used to develop new products or enhance existing product designs. Embedded sensors on industrial equipment, helps a company to have access to the machine's key performance parameters such as temperature, pressure and ambient condition. This information, enables the company to calculate the remaining life of critical parts of the equipment and plan timely replenishments, avoiding expensive shutdowns (Mc Kinsey&Company, 2015).

iii. Improved supply chain performance

IoT can improve performance across the entire supply chain through automation and enhance end-to-end visibility. Using a combination of sensors, connected devices and communication channels (3G/4G, GPS, Bluetooth, Internet, etc.), companies could have an ability to monitor transit status, including factors such as location, temperature and diagnostics real-time. Many companies in food industry are already using this technology to monitor the real-time transit information and optimize the freshness of perishable cargos (Mc Kinsey&Company, 2015).

iv) Analytics and intelligence

Significant advances have taken place in this domain with the help of digitalization. Artificial intelligence coupled with machine learning provides huge data that could be used for improved statistical techniques and advanced analytics. (Mc Kinsey&Company, 2015)

v) Human-machine interaction

It is proven that with consumer's familiarity with new ways of interacting with machines due to growing use of personal devices has resulted in an increase in greater human-machine interaction. Touch interfaces are already ever-present in the consumer world today and gesture recognition as well as virtual and augmented reality devices are increasingly in use across all sectors of industry. Under Industry 4.0, it is believed that all existing equipment would be upgraded mainly in the dimensions of sensors and connectivity (Mc Kinsey& Company, 2015).

2.3.4 Digital strategies for pharma industry

Considering the amount of time and resources that are invested in drug research, development, manufacturing and marketing, the pharmaceutical industry is definitely a big complex ecosystem. With years of painstaking efforts to get into the market, the business model of pharmaceutical companies hinges on their ability to monetize on drugs they bring to market. It is essential to optimize resources to ensure return on investment (ROI) is ensured for whatever the companies invest for (Frost & Sullyvan, 2014).

Technology has revolutionized most sectors of pharmaceutical sector. The above facts and findings are substantiated in the case studies of Indian and global pharma companies discussed in this thesis. Considering the challenges and opportunities discussed above, it is thus essential for pharmaceutical companies to embrace technologies and have a clear digital roadmap to implement to achieve set objectives (McDonald M, 2015).

Areas of digital opportunity

There are four main areas where digital developments will drive value for pharma companies, building on what we see as the key components of digital success, i) an ability to deliver more personalized patient care, ii) engage more fully with physicians and patients, iii) use data to drive superior insight and decision making, and iv) transform business processes to provide real-time responsiveness (David Champagne, 2015). Companies do not have to become leaders in all four areas across the organization. Some companies deliver more value than others in relation to any given disease, depending on market dynamics and their portfolio. But to decide where to concentrate their efforts, an organization must develop a point of view on each area's potential to transform their commercial and innovation models.

To help in these decisions, an effort is made to highlight the key aspects of some areas of digital opportunity and the how the pharma companies can become successful in the near future (David Champagne, 2015).

i) Personalized care: Sensors and digital services for tailored, 24/7 treatment

It is found that an organizations' ability to personalize interactions with its stakeholders using the latest digital technology is key value driver in any industry. In pharma, this value can be realized in a better way through the use of sensors and digital services that can provide tailor made care around the clock. Most of the drugs are part of a digital ecosystem that constantly monitors a patient's condition and provides feedback to the patient and other stakeholders involved in the treatment. For example, a care program for a Parkinson's patient might include a medication regimen with "chip on a pill" technology to monitor the use of the drug coupled with a smartwatch that can monitor patient's condition, sends the reminders to comply the prescribed treatment and also updates the compliance and health status reports to the neurologist. The neurologist counsels the patients on lifestyle changes and even customizes therapy remotely. These types of digitally enabled advancements in patient care shall improve the outcomes to an extent that they can be a part of reimbursement system, particularly for expensive and specialty drugs (Patrick Tucker, 2014).

ii) Fuller engagement: Omnichannel conversations with physicians and patients

For Healthcare companies, digital engagement technologies open up a whole new world for marketing. Exchange of information, recruitment for trials etc. Medical representatives, medical-science liaising teams, and patient-service department's teams can communicate and influence patients, physicians, and caregivers with the help of wide range of social media with the increasing use of smartphones. For example, a company focused on pediatrics, NeoCare Solutions a company developed by Aetna, gives new parents returning home with infants from the intensive care unit on demand coaching from a neonatal nurse. Regular interactions and real-time updates offer pharma companies the opportunity to derive value proposition in their business. To make it happen, companies will have to build advanced digital marketing and engagement capabilities similar to those successfully adopted by leading retailers, airlines, telecom companies, and consumer goods companies.

iii) Data-driven insight: Advanced analytics to increase pipeline and commercial value

Being an intense science and process driven sector, pharma companies sit on a wealth of data, usually locked away in different technical and organizational silos. Some companies have successfully linked and mined their data sets to improve pipelines, products, and strategies. This is very minimal compared to the number of pharma companies and considering the market size and growth there remains a huge opportunity to create further value from data and analytics using internal and external data sources to drive superior results. Few areas where companies are adopting include:

R&D – Considering the challenges in change in regulatory pathways, long gestation periods, drug discovery and the testing of molecules with advanced modeling and simulation techniques will be commonplace in future. For instance, physiological simulation will accelerate product development, and with the help of computer simulation, 3-D tissue modeling will help assess potential toxicity. In late stage of drug development, sensor data streams from *in vivo* clinical trials captured by wearables will be factored into the dossiers which will assist in registration filings for early marketing authorizations.

Marketing and sales forces **-** With the growing competition in the market place, understanding of prescribing behavior and potential patient profiles is key factor for a success. Adoption of advanced sales force effectiveness tools, business analytics will be a guiding factor for more precise information there by increasing the number of prescriptions from the doctors. For example, a "patient finder" technology that mines electronic medical records to identify sufferers from specific rare diseases will enable sales forces and medical science representatives to focus on providers caring for patients likely to have those diseases, although they are as yet undiagnosed.

iv) Real-time responsiveness: Automated processes to improve cost, reactions, and agility

Cloud and mobile technology, sensors, and next generation business intelligence will bring about a new wave of automation in business processes. These tools will bring streamlined, automated work flows with few handovers and end-to-end, real-time

transparency on progress, costs, and business value. These outcomes will transform a step change in the efficiency, responsiveness, and agility of a wide range of complex cross functional activities, processes in departments like back office, supply chain, R&D, commercial teams etc. While conducting clinical trials for new drugs and generics, Clinical-trial management, from recruitment to submission, is another area that will see dramatic change with use of advanced tools. Targeted online recruitment and remote-monitoring technology like sensors, connected devices, and apps will enable clinical trials to take place in "real world" settings. With this experience patients can lead normal life with very minor changes in habits, while participating in a trial. Other benefits are minimal interventions in clinics or trial sites during the trial of a drug will reduce the burden on patients. Increased connectivity and digitalization in trial management processes will also enable advanced trial design and monitoring approaches. For example, sites and sponsors can be seamlessly connected across all functions in order to support the data management and analytics required for adaptive trial designs will increase the efficiency of the trials, bring down the costs and better results.

Outcomes of digital strategy adaptation in pharma industry

During the past decade, as per the findings there has been a change in the mindset of most pharmaceutical companies and a digital wave has swept the USD 17 billion Indian pharmaceutical Industry. The Pharma companies are now keen in adopting technology in every aspect of their operations (Raghava P, 2016).

Digital strategy can be implemented phase wise depending on the company's activities, resources, preparedness for implementation. Figure 2.11 illustrates the digital tools used in each functional or domain of the pharmaceutical industry. Detailed review of each digital application will be reviewed in the next chapter.

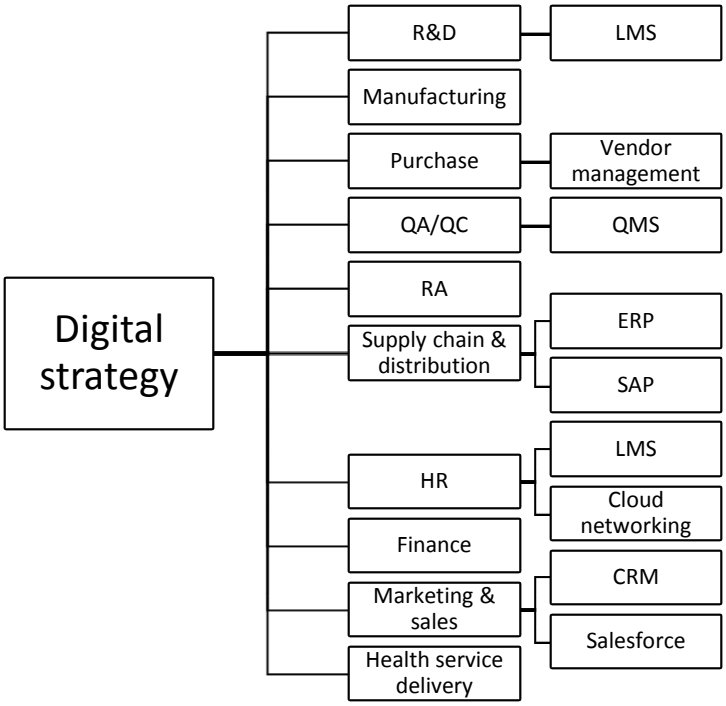

Figure 2.11: Various digital tools used in different functional domains of the pharmaceutical industry

2.3.5 Summary

In the connected world today, leading global companies discussed in this thesis constantly innovate. This new innovation does not only come only from in-house R&D department but also from crowd networking social media. New innovations support firms in internalization of research and market development in scales never before seen. This does not exclude the possibility of small and medium sized firms from benefiting of new options. In fact, they may benefit better than the larger firms with their cost and infrastructure challenges leading to gaining better cost advantage.

Amidst fears of fierce competition, globalization, regulatory challenges, dotcom and "digital" hype, the digital technology in pharmaceutical industry has travelled from infancy stage to sophisticated computing, websites and intranet portals, automations in supply chain, sales tracking to cautious exploration of digital technologies in R&D, e-detailing, regulatory and customer relationship management. The digital strategy could be optimized for every part of pharmaceutical industry (Lerer. L, 2003.). One important aspect of the new digital wave is everything is customizable and trackable.

2.4 Digital Marketing – Game changer for Pharma companies

2.4.1 Background and Introduction

Marketing function utilizes any form of digital tools to promote any product or service are classified as digital marketing. It includes many forms of digital tools like web, e-mail, interactive TV, IPTV, wireless media (Coviello, 2001). As per (Urban, 2004) digital marketing adopts and utilizes internet or information technology to extend and improve traditional marketing functions & activities for better customer reach. Internet is transforming business economies of marketing and the traditional strategies are becoming redundant or obsolete. Due to easy access of digital tools, market is undergoing constant evaluation with the power of internet. In the current global scenario and with the availability of various technologies, the internet provides valuable information on how consumers engage with company's brands and services.

On the other hand (Chaffey. D, 2006) suggests that operating and management procedures are required as in traditional marketing for the success of e-marketing. Furthermore, integrating traditional and digital marketing could enhance the performance and success. The concept of e-marketing is considered to have a wider scope because the concept itself refers to digital media including websites, email, electronic multimedia, wireless media and mobile media. Importantly it includes management of data or data mining, information management and electronic customer relationship management systems (e-CRM systems). The term "digital marketing" is well coined by some academics and business managers and is being increasingly used.

Role of technology has changed the marketing world during the last decade and pharmaceutical marketing is not an exception to this change. Digital technology is clouding the distinctions between companies and industries. Companies evolved in pre-internet era are termed offline companies and they are looking to develop digital capabilities by partnering with those that have adopted the digital tools. Online companies evolved post-internet era and they are learning the art of science and technology to deliver of their products and services. This has resulted in rapid rise of digital partnerships (The Economist Intelligence Unit, 2015).

Philip Kotler rephrased the four P's of marketing by additional conveniently an "e" making eProduct, ePlace, ePrice and ePromotion which is the new digital concept espoused. However he is of the view that the concept of electronic marketing is wider and more complex since there is a need for integration with traditional marketing (Kotler, 2008).

2.4.2 Digital Marketing Channels

There are at least six main types of digital media communications channels as indicated in the Figure 2.12 below. However, integration with traditional marketing is vital for success (Chaffey, 2006).

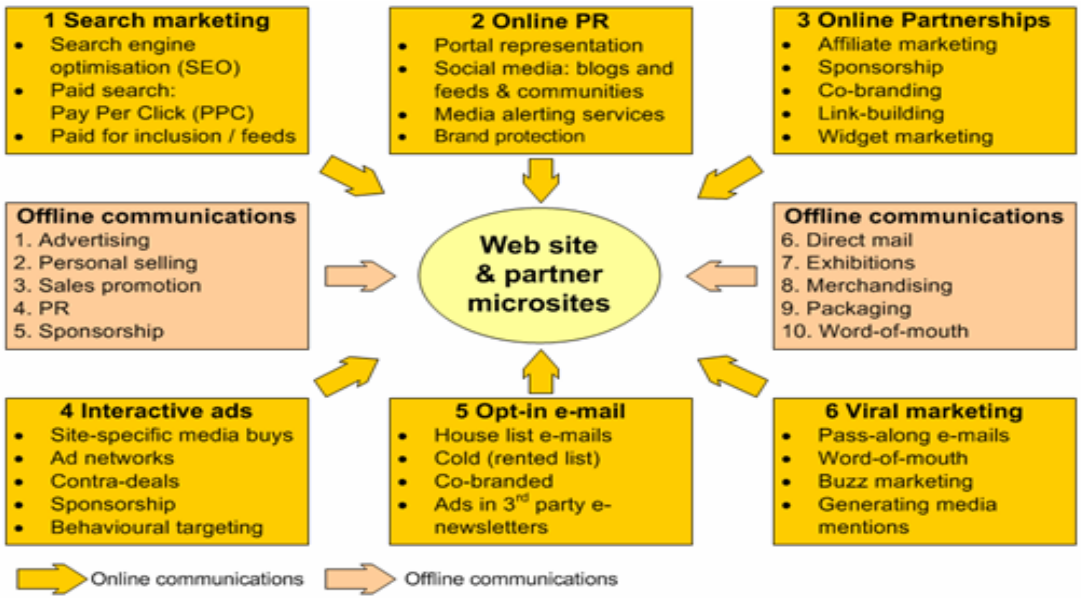

Figure 2.12: Six Digital communication channels; adopted from www.Dave Chaffey.com

It is very important to understand some of the digital channels widely used in the marketing are briefed below:

i) **Online advertising** - This covers advertising in all areas of internet – advertisements in emails, social network and mobile devices and display advertisements on normal websites (Stokes, R, 2008). Online advertising plays a pivotal role in digital marketing and is extensively used to market products and services. However pharmaceutical products have limited scope for online marketing due to regulations and characteristics involved.

ii) **Online video and interactive television advertising -** According to (Pavlov et. al.,2008) online video and interactive campaigns are more effective and quicker in delivering twice the ROI of other main forms of online marketing such as web banners and online directory adverts. Pharma companies use this mode of digital tool to advertise the company and campaigns but not the prescription drugs.

iii) **Email Marketing** - In essence, this tool is a conversation between company and current or prospective customers. It can be used to attract new customers, but it can also be used to maintain a relationship between current customers and business in a way that the business is always in touch with customer through a personalized experience. While drafting marketing emails, one has to be very careful of the tone of the language (Dan Morley, 2009). In recent years email marketing is losing its importance due to spammy contents. E-mail marketing is relatively much more economical compared to advertising or other forms of media coverage. With the use of certain tools and techniques, the power of e-mail marketing could be easily unleased and the issue of spammy emails could be effectively reduced.

iv) **User Experience Design** - User Experience (UX) design, is to understand how visitors interact with company website & what would be the areas of interests. Every website owner is asked by marketers to showcase specific things that they want their visitors to do. The goal of good UX Design is to increase the number of website conversions that take place without necessarily increasing website traffic. UX Design is like having the right decorations and details – right centerpieces, right lighting, right color scheme, right master of ceremony leading to complete buying experience virtually like in video games. (Dan Morley, 2009).

v) **Text Messaging** - Communicating message about product and service using any form of cellular and smartphone devices was one of the first tool used. Company can send information in the form of text (SMS), pictures, video or audio (MMS). Marketing through cellphone Short Message Service (SMS) was extremely popular and about two decades back and boosted of being the most economical way of

communication. The SMS services have been revived again with the option of sending mass and customized messages by click of a button through internet and web services.

vi) **Affiliate Marketing** - This is a performance based marketing where a company rewards affiliates for each visitor or customer they bring by marketing efforts they create on behalf of company. Company's main goal in this model is to find affiliates who can reach untapped markets or wherever self-access is restricted. For example, a company introducing one's offer through "trusted" company can grab the attention of prospects which might not have otherwise reached (Afrina Yasmin, 2015). Affiliate marketing alos sometimes combines the benefits of co-marketing a product. For example, Pizza company co-marketing with Cola drinks.

vii) **Search Engine Optimization (SEO)** – is a process of affecting the visibility of a website or a web page in a search engine's "natural" or un-paid ("organic") search results. It allows ranking of websites or web-pages so that they remain visible on various search engines such as Google, Bing, Yahoo, etc. to their visitors (Afrina Yasmin, 2015). With the help of SEO a website could reach to its end user through right digital platform. Search ranks are manipulated by using the SEO strategies resulting in better search rank on search engines (Javier A. Silva, 2011).

viii) **Pay Per Click (PPC)** – It is a way of using search engine advertising to generate clicks to a webpage rather than "earning" those clicks organically. This is a faster way to show on searches and connect to respective users. The PPC platforms provide all analytics through customized dashboards. The companies pay only for the desired/promised results. Unlike the conventional marketing strategies, PPCs prove to be one of the most preferred techniques of modern marketers.

ix) Forums and discussion sites - Online forums and discussion sites have become part of daily life ever since the inception of internet. Some general discussion

groups like Yahoo Groups (http://groups.yahoo.com) and Google Groups (http://groups.google. com), are quite popular and offer topics related to anything under the sun (Javier A. Silva, 2011). It is one of the best tool used to spread the benefits of product like a word of mouth model. Used extensively by pharma companies for patients and healthcare providers.

x) **Wikis** -Wikis are online collections of web pages that are literally open for anyone to create, edit, discuss, and comment on and generally contribute to & touches almost every sphere including medical & pharmaceutical sciences. According to (Kaplan, M, 2010) collaborative projects like Wikipedia, are becoming a main source of information for many consumers globally. Irrespective the authenticity of the information, it is believed by thousands of consumers.

2.4.3 Role of e-commerce in pharmaceutical industry

The rise of a billion new middle-class consumers in emerging markets due to economic advantages has led to the rise of e-commerce. When it comes to purchase making decisions, mature market consumers are attaching increased value on personalized products rather than standard offerings by companies. Due to stagnant economy, customers are cautious. While spending they look for greater value amongst available choices. With an increase in real estate values, conventional retailers find it challenging on store size and shelf space. Due to rise in logistic costs retailers find it difficult to meet diverse needs of both emerging and mature markets around worldwide. The cost of maintaining variations of all products is not a right proposition. Considering the above factors, the economically viable and successful way to fulfill diverse need of customers is by leveraging digital channels such as e-commerce (Chaudhury, Abijit, 2002). This is even applicable to pharma industry where online pharmacies have emerged during recent years.

The pharmaceutical industry is a capital and research-intensive industry on one hand and driven by prescription and retail dependent business on the other. A recent study emphasizes that pharmaceutical industry is more driven to gain competitive advantage through innovative technology (Frieden, 2006). The revenue generation from e-commerce

surpassed all expectations from a mere 0% in 1995 to over $3.5 billion by the end of year 2000 to over $10.2 billion as per recent estimates. By the end of 2015, 70% of operational economies of companies were generated by e-commerce, thus proving the success of e-commerce business (Graham, 2008).

E-Commerce in pharma industry can be also classified as E-marketing, E-operation, E-selling and E-clinical electronic transactions. It is observed that pharma sector expands its presence by online and digital campaigns which provide relevant information aimed at a specific target audience and attract new investors. Proper positioning of the company and its products through online and digital media helps companies to reach wider market, increase their bandwidth and hence reach untapped potentials. This approach may have some limitations such as, uncertainty of the users about the validity and authenticity of products and information but a well-designed approach such as, openness to contact and discussion, on-line advice by registered professionals could gain confidence, improve acceptability and trust and reduce down problems.

Deployment of e-commerce in pharmaceutical industry centers on significant gains in business transactions by building an integrated network for both industry and users by shrinking geographical distances. As quoted by (Devendra Chaudhry) there are four key types of activities seen in the development of e-commerce in pharma:

i. Focused information to the customers and target groups
ii. Corporate identity sites – For accurate information profile different pharma companies to give proper medical information
iii. Gateway sites – www.catesource.com. These sites act as centralized points of entry into diverse resources of information on the internet. This is created by common channel for exchange of commercial and non-commercial information
iv. Store fronts and Strip mall – www.validate.com such sites focus on information that is directly useful to the Pharmaceutical profession. These sites mainly focus on the user and retailer relationship. For example, a web tool called Pharma Indonet is a high traffic web and drug information designed for public health, professionals, and consumers can also be found

Over the years, when compared to other sectors of industry, pharmaceutical sector could manage to gain sustainable advantage through e-commerce options considering the fact that e-commerce has equipped other industries to boost their business by:

- Providing most current and updated information to the end users and vendors by following strict auditing and quality measures
- Providing customized training and support directly to target audience
- Enabling submission forms for regulatory purposes that makes filings more easy
- Providing on line patient satisfaction surveys to gain the confidence of the customers
- Delivering patient and product specific information to give the updated data

Many researchers believe that pharmaceutical industry provides significant support to its users by advising and through secured access to an individual's prescription history. Gathered data of patients, disease and therapy is further used for development of new products, services and strategies. With the help of a master database, company can maintain constant communication with doctors/pharmacists and could even enable subsequent follow ups to patients based on prescriptions. In the current research, it was found that evolution of e-commerce helped the conservative industry to adopt to digital age and hence strategic importance of e-commerce in the pharmaceutical industry is indeed significant.

2.4.4 Social media as a digital tool in pharmaceutical marketing

Researchers and academics are of opinion along with numerous surveys and research articles by firms that the medial and pharma industry have been increasingly witnessing the use of smartphones and social media including the use of blog sites by customers, medical professionals and patients to discuss drugs to market pharmaceutical to niche markets and customers. It highlights the importance of digital marketing for the marketing of pharmaceutical products and companies (Chappuis, 2011). A survey conducted by McKinsey indicates that consumers and the pharmaceutical companies increasing use Facebook and that the use of smart phones by medical professionals and consumers are in the increase across the world.

In the connected world today, companies such a Johnson and Johnson, Proctor and Gamble constantly innovate and the innovation does not only come from in-house R&D department but from crowd networking social media. These new forms are double edge knifes because they support firms in internalization of research and market development in scales never before seen (Tapscott, 2007). However, this doesn't exclude the possibility of small firms from benefiting from these new mediums. In fact, they may benefit better than the larger firms with their cost and infrastructure challenges leading to gaining better cost advantage.

The very importance of social media could not be ignored. According to Nielsen report (Global Faces and Networked Places, 2014), internet users spend more time with social media sites. Facebook, Twitter, LinkedIn and Google+ remain the most commonly used social media platforms globally. Globally pharma companies are using the social media as a key digital marketing tool to engage its customers through various interactive and interesting topics. Below Table 2.7 lists out various social media tools used by different companies as illustrated in (Pharma and Healthcare Social Media).

Facebook	Twitter	YouTube	LinkedIn	Flickr	Google+
AstraZeneca	AstraZeneca	AstraZeneca	AstraZeneca	GSK	Pfizer
GSK	GSK	GSK	Novartis	Novartis	Roche
J&J	J&J	J&J	Pfizer		
Merck	Merck	Merck	Roche		
Novartis	Pfizer	Eli Lilly			

Table 2.7: Various social media applications used by global pharma companies

With the help of these platforms, the pharmaceutical giants provide updated information on new drugs, educate patients about their health issues and also strengthen their relationship with patients and healthcare professionals. Instead of getting the information on product and services from any third-party sources, the end user gets the first hand trustworthy information directly from pharmaceutical companies. An effort is made to review the role and benefits of social media applications in pharma marketing.

i. **Facebook** - Facebook represents a wonderful place to have conversations, answer questions, do interviews and tell stories (Leah Pearlman & Abram, 2010). This is by many companies for being in constant touch with the end users and prospective consumers, answer their queries, run marketing campaigns and advertisements for products and services. Facebook offers several added benefits and options to business pages to help them expose their brands, collect stories, and remain connected to end users all the time. In a successful case study conducted by Merck using Facebook to create awareness on cervical cancer and persuade target audience to share with their friends (P Gupta, A Udupa, 2011).

ii. **LinkedIn** - Founded in 2002, LinkedIn was basically meant for users to connect with one another for business or professional purposes such as finding jobs and exploiting business opportunities (Leah Pearlman & Abram, 2010). Just like Facebook, LinkedIn marketing activity revolves around groups and pages, however with a different terminology (Zarrella , 2010). Pharma companies use LinkedIn to share developments, achievements, and strategies of employees as well as company. Dr. Reddy's used LinkedIn when the company changed its logo and the tagline.

iii. **Twitter** – Twitter is a gateway drug to social media as quoted by Jim Storer, Sr, Director, Social Media Strategy, Mzinga. It combines the advantages of micro blogging and social networking as a realtime short message known as "tweets" of no longer than 140 characters (Leah Pearlman & Abram, 2010). Tweetosphere hosts millions of tweets and active subscribers. Twitter had got a boost of 1382% growth in its user base between February 2008 and 2009 and has an ever increasing user base. Like Facebook and LinkedIn, Twitter can be used both by individuals and companies. Recently Sanofi, one of the largest European pharma companies and the leader in Diabetic drugs has used Twitter to create a community of 4000 diabetic patients along with Facebook (Zarrella, 2010).

iv. **YouTube** - YouTube was founded in 2005 and currently is one of the most popular video sharing sites. Within 3 years of its launch, it captured 60% of all videos viewed online and had more than 79 million subscribers . During the same time, more than 65 thousand videos were uploaded every day on YouTube (Stokes, R, 2008). YouTube is a convenient platform for business campaigns and allows large video files to be

shared to the world without any much infrastructure. The JNJ Health Channel of Johnson & Johnson was designed to host "Videos to promote a better understanding of health, from the Johnson & Johnson Family of Companies." YouTube is favored by physicians for highly informative, detail-orientated videos, engagement correlates to emotive patient focused content. The videos can be linked to other social networks (IMS, 2014).

v. **Flickr** - In the 1980s and 1990s the Internet was only used for mailing, and online services such as bill payments or any Newspaper columns, however now the landscape had completely changed. Through Flickr Users can share their photos either their personal, business related, community activities, can be shared within online groups and communities (Stokes, R, 2008).

vi. **Google+** - Google+ User profile is a publicly visible account of a user that is attached to Google account. This includes basic social networking services like a profile photo, about section, background photo, cover photo, previous work and school history, interests, places lived and an area to post status updates etc. (Siegler, M.G., 2011).

2.4.5 Summary of various successful digital marketing tools adopted by global pharma companies

Global companies in all sectors are successfully implemented and executed digital marketing tools as a part of digital strategy well in advance. These companies are successful in terms product development, market entry, seamless integration across all subsidiaries across the globe. Below success stories proves that embracing the latest technology is the key to success.

i. Sanofi Pasteur's MSD

Sanofi was the first European vaccine company moved towards digitalization. Due to digitalization consequence Sanofi started growing tremendously. Apart from growth there will be problems similarly which is the universal truth. The major problem encountered initially was the communication gap between the teams. To transfer commercial operations worldwide Sanofi felt that a single global solution

with multi-channel capabilities and integrated content management to provide a holistic view of the customer and drive orchestrated engagement. Sanofi was searching for an utmost, complete and lively software which can support multifaceted vaccine market with diverse customers across the market and introduced Veeva CRM, a part of Veeva commercial which serves the purpose of being present on multi-channels. Veeva CRM with digital channels integrated the global commercial strategy of the company and the following positive developments seen in the company.

- vision for face to face customer engagement
- email to extend reach and send compliant, personalized content
- engage HCPs to self-directed online access to access e-details from any device
- implementing all type of events management plans

This kind of approach leads to the jumping of field teams and brand managers into the company. User satisfaction inclined remarkably high. Veeva CRM was voted with a record of 80% respondents in order to accept growth. Many companies have increasingly building their own customized online/app-based platforms. The quality of customer engagement increased considerably due this digital adoption. Similarly, GoMeals, an iOS and Android based-app launched by Sanofi- Aventis for diabetic patients helps to identify nutritional content of food they eat. In addition, it also offers various other added benefits such as activity tracker, glucose tracker, restaurant locator and cloud sync. This new trend is quite different from conventional marketing approach which tends to push more generic information over longer lead times. (Digital Strategy Consulting, 2009).

ii) Teva Pharmaceuticals

As adopted from Veeva Systems, 2016, Teva Pharmaceuticals Unifies Global Commercial Strategy with Veeva CRM. Teva started acquiring companies in early 2000 to expand the business. To share best practices, and capture a comprehensive view of the customer Teva had to harmonize its commercial go-to-market strategy across regions and divisions. Owing to different customer relationship management

(more than 35 different systems in Europe alone) systems worldwide due to acquisitions Teva started facing challenges. Teva needed a unified CRM system globally that was configurable to meet local requirements and support all teams across generic and branded drug products.

Through an extensive analysis of the leading cloud CRM providers, Teva identified multichannel Veeva CRM, part of Veeva Commercial Cloud as the best solution. Teva embarked on a global initiative to redefine its commercial strategy, putting the customer in the center by using Veeva CRM. It obtained holistic view of customers to coordinate interactions across channels by using Veeva CRM which is easily accessible in the cloud and interoperable with critical applications. Similarly, this software offers functionality to manage key accounts and build relationships with stakeholders. The company re-assessed users to determine the impact of the switch after Veeva CRM went live. The improvements across multiple areas reported by respondents overwhelmingly including:

- productivity and efficiency of all customer-facing teams increased
- higher-quality interactions with improved customer experience
- greater collaboration and channel orchestration across commercial teams
- single, complete view of customers across the multifaceted stakeholder landscape

To expand its cross-channel customer engagement to give customers the information they want, when they want it, and through the channels they prefer. Teva plans to continue leveraging additional Veeva Commercial Cloud applications. In fact, Teva UK is leveraging Veeva CRM Approved Email for compliant email communications, and exploring Veeva CRM CoBrowse for sharing rich content with customers online. The corporate goal for Teva's commercial organization is to continue incorporating key digital channels into its marketing mix for richer customer interactions through all preferred channels.

iii) GSK Pharmaceuticals

For HIV specialists GSK developed a promotional website www.sciencexchange.co.uk in 2007. The site offers HIV specialists a one stop solution for exchanging information on HIV and its management. Till date the website has 4000 users in the UK, creating a strong knowledge base to engage with clients, as opposed to time consuming one-to-one field sales consultations (Digital Strategy Consulting, 2009).

iv) Johnson &Johnson Pharmaceuticals

As adopted from Ron Ploff, Johnson & Johnsson, June15 2009, New Media Lessons from a 123-year-old, $64 Billion New Media Innovator. In 1996 "**jnj.com"**, a three-letter URL launched by Johnson & Johnson after 110 years of its inception. This website is visited by approximately 126,0002 American visitors per month with 76001 indexed pages which became during its initial Web 1.0 style. J&J launched its Twitter Channel (@jnjComm) in March 2009 to report live on executive statements to analysts, point to articles in the press, and help others tap into the information stored within the company's rich online properties.

v) **Roche International**

Adopted from: Capegemini, 2015, Capgemini Consulting helps Roche "Go Google" After acquisition of Genentech in 2011 Roche was struggling with cultural and technology alignment issues Roche had to move to the cloud to maintain parity or otherwise secure competitive advantage in the biopharmaceuticals industry by seeking to embrace Genentech's innovative heritage and approach. The SMAC technologies (social, mobile, analytics and cloud) by Roche give employees the ability to work from any place, any time, in an effective and effortless manner, and that means better business, period. Roche selected Google based on the following five criteria:

- Google's updates occur in real time and are tested and Genentech had already migrated to Google and presented credible evidence
- An integrated and socially-focused approach with novel means of pushing applications via the Google control panel
- Google's security measures would eliminate the need for VPN

In summary, Roche felt that Google would best help the organization realize its goal of transforming employee behavior and advancing an organization-wide culture of collaboration and innovation. With a crisp understanding of the road ahead, Roche leadership enlisted the team at Capgemini Consulting to "Go Google." Capgemini has since developed a portfolio of digital-centric solutions which helps clients maximize their return on investment when undergoing a large-scale effort such as an enterprise-wide cloud migration. Unlike the restricted, programmatic approaches advocated in conventional migration methodologies. By moving enterprise data to the cloud, Roche being the first amongst its industry allowing its employees to work together with greater efficiency from all global locations.

vi) Novartis

To focus on all four major solid organ transplants, Novartis set up a patient focused website. This website ran advisory panels of patients and healthcare professionals to safeguard that the structure, content and navigation of the site suited end user needs. Over 500 pages of information containing animations, e-newsletter, were produced. This was a good example of smart digital marketing in pharmaceuticals because much of the content is timeless, and supports families of patients as well as patients themselves (Digital Strategy Consulting, 2009).

vii) Boehringer Ingelheim

For the sale and awareness of Brand Asasantin Retard, an anti-thrombotic agent, Boehringer Ingelheim (BI) worked with Doctors.net.uk to run a 12-month campaign. BI targeted UK-based GPs, cardiologists, neurologists and elderly care physicians by using promotional content, NICE guidance, online education modules and webcasts. Doctors.net.uk is a good example where only registered doctors are allowed access, creating a space which unquestionably fits within the regulations for marketing pharma brands. For a prescription medicine, this is a powerful way of reaching doctors, who are increasingly reliant on internet for up to date information and are already deeply engaged in key online media platforms. The web also allows a greater depth of information and engagement than traditional advertising can manage (Digital Strategy Consulting, 2009).

viii) AstraZeneca

To promote Nexium, an acid reflux treatment, AstraZeneca hired AvenueA/Razorfish in 2005 to educate the target audience (aged 35 years or older) and build their brand preference. Tactics included coupon downloads, driving qualified potential customers to the site and marketing objectives included boosting overall brand awareness. The Nexium website was further redesigned for 2006, with a personal pal like meal-planner; and the ability to sign up for pill and refill reminders by email thereby giving better engagement with customers (Digital Strategy Consulting, 2009).

ix) Ferring Pharmaceuticals

Ferring to promote its needle free pen device ZomaJet ran a video campaign. This device delivers growth hormones using subcutaneous route by a technique called transjection without the need of a conventional needle. Ferring used MJL consultants to create a video demonstrating the product as "child friendly" and the product was shown as a cartoon character to attract target audience. The strategy of using cartoon style also helped kids to see the process as a fun novelty rather than a chore. The video was combined with leaflets and poster materials. The entire campaign was distributed online using YouTube and also distributed CDs through healthcare providers (Digital Strategy Consulting, 2009).

x) **Merck -** Merck set up a Facebook fan page with 100,000 followers so far about cervical cancer to raise awareness of the condition and persuade the target audience to tell their friends for campaigning its cervical cancer vaccine Gardasil. By disabling the comments wall the execution of a fan page was extremely simple with good use of Facebook's boxes, with quizzes, slideshows and send to-a-friend tools, alongside user videos and wallpapers (Digital Strategy Consulting, 2009).

The table 2.8 summarizes all the above information. It is quite evident from these examples that the digital marketing tools could play a pivotal role in reaching out to the target audience and engaging them with the company or brand in a much better and effective way compared to that of conventional methods.

Table 2.8: Summary of various digital marketing strategies used by global pharma companies

Sl. No	Company Name	Country	Challenges & Purpose	Digital tools adopted	Outcomes
1	Sanofi	France	Uniform content management globally for promotion of vaccines	Multichannel CRM	Customer engagement was highly successful with 80% customer satisfaction
2	Teva Pharma	Israel	To integrate 35 different systems in European market	Unified CRM	Customer centric CRM helped to redefine commercial strategy putting customer in Centre using cloud technology
3	GSK Pharma	United Kingdom	To capture personal data of the patients and to increase the interaction	Promotional website for HIV patients	Website has been used by 4000 HIV patients; created a strong knowledge based platform to engage patients
4	Johnson & Johnson Pharma	USA	To convey the history, philosophy, objectives	Twitter handle	Twitter handle had 126,000 followers in USA; increased the customer loyalty
5	Roche	Switzerland	Cultural & technology alignment after acquisition of Genentech	SMAC technology using cloud via GoGoogle	Seamlessly allowed its employees work together greater efficiency globally
6	Novartis	Switzerland	Single point information centre for doctors, patients, families	Interactive website	For patients using drugs for organ transplantation this tool provided complete information
7	Boehringer Ingelheim	Germany	Sales and awareness to run a campaign for doctors in UK	Developed a dedicated website	Could reach doctors allowed access and created a space for prescription drugs
8	Astra Zeneca	UK	Nexium product promotion in acid reflux disease	Created Nexium website	Top 3 most visited website and received best pharma advertising website
9	Ferring Pharma	Germany	Promotion of ZomaJet needle free pen to youngsters	Online video using YouTube and CD	Carton like character of the new injector pen helped kids to get accustomed with usage
10	Merck	USA	To reach female audience to create awareness on cervical cancer	Created a Facebook page	More than 100,000 patients follow this page and excellent reach to target audience

2.4.6 Need of Digital marketing tools in Indian pharma industry

As per Indian Pharma Digital Health report (D Yellow Elephant, 2015) the digital health of Indian pharma industry was mapped to determine loopholes. A plan was developed to resolve these loopholes and to implement these plans as part of the decision-making process. It was found that, in spite of major pharma companies' presence in the social media platforms, their level of active engagement with consumers was found to be low compare to global companies. Only nine out of 40 companies managed a score above 50 out of 100.

- Only eight companies have India-specific Facebook page
- Google+ has high presence of 87% , but only one company is active
- Twitter showcases 52% active management (India and global handles)
- LinkedIn, most popular social media platform, but only 14 are active

Therefore, it can be argued that though there has been an increase in use of different channels of marketing, the acceptance of digital platform for marketing purposes in pharma industry is relatively low compared to other industries. The reason could be attributed to its cautious use due to the uncertainties of the regulatory framework that did not support the industry while other industries used it aggressively. However, aggressive use can be seen in only those companies that have integrated digital marketing into their corporate strategy (Smitha Sarma, 2016).

In order to understand the usage of digital tools it is important for a company to understand the successful models of other companies to minimize the gaps. Internal buy-ins and better compliance can be ensured significantly by integrated effort throughout various cross functional teams. (P Gupta, 2011) found that the increase in positive response of key consumer groups are patients and doctors, especially in young age group market. The use of social media marketing is basically to target the young age group because the young age doctors and patients frequently use internet and they spend on average of at least 10 minutes daily on internet. It was found that around 40% pharmaceutical promotional spending was on consumers and it is further increasing due to the new promotional activities like detailing, internet, conferences, seminars, television etc. (S.Fox, 2008.) Further, (Ernst and Young in 2010) anticipated that the Indian pharmaceutical industry has now entered in

"Pharma 3.0" or one can say that the era of health outcomes (Dinesh Chindarkar, 2015). Looking at global pharma companies, Indian pharmaceutical industry should move towards digital and interactive media. From 2009 to till date industry has adopted the social media or digital media have been offering the possibilities as online conversations with doctors and patients. Despite all the benefits of digital media, the social media budget of pharmaceutical companies accounted for <1% of average budget. The positive note being, the chief marketing officers wanted to increase the budget to 5%. Furthermore, the pharmaceutical firms still struggle to varying degrees to adopt various channels of social media while complying with rules and regulations that govern communications with the public, consumer and patient. One of the main reasons of this could be the fact that there is a lack of expert pharmaceutical professionals with adequate knowledge and skills of IT set up on one hand and digital marketing on the other.

According to (Kevin Campbell, 2016) social media is an ideal channel for pharmaceutical and medical device firms to educate, market, listen and connect with customers, patients and physicians while complying with industry regulations. Some approaches include:

a) **Education**: Companies should consider offering relatively non-biased disease-specific educational information aimed at consumers. This information should present topics broadly to help patients understand their disease so that they may better engage with their healthcare providers to improve outcomes.
b) **Marketing**: With the help of press releases on new drugs, devices, features, clinical trial results, etc., social media could be a powerful marketing tool. The companies could also build trust when it comes to community service, major investments in charities and their commitment to develop new and better treatments for a particular disease process.
c) **Connection with Customers/Patients**: One powerful way the industry can use social media is to create patient support groups and communities. These allow like-minded patients to connect and interact often discussing benefits of a particular treatment, hospital, doctor, etc.

d) **Connection with Physician-Customers**: Besides using the existing social media platforms, the pharma companies could build their own customized tools to engage large number of physicians at one time. This would be a great opportunity to ask questions rather than be "detailed" about a drug by a rep that is simply regurgitating a memorized script concerning a new study to the physician-customer.

e) **Clinical trials**: Enrollment of patients and doctors for the study is considered as one of the biggest barriers and expenses to the company. It was found that 30% of time is spent on recruitment and due to this around 40% of sites miss enrollment targets. In this case that social media can become a powerful enrollment tool. A recent study showed that social media can effectively improve enrollment and help researchers to achieve enrollment goals in less time with less expense.

f) **Listening**: Social listening can be very powerful if it is conveyed in effectively to the right target audience. Pharma companies can identify unmet needs to innovate and figure out where R&D should invest its resources. Social listening also can allow a company to learn from the mistakes of competitors. Listening also allows company leaders to have an informed dialogue with the corporate attorneys and assist in developing policy to develop the drugs.

2.4.7 Summary

Exponential growth of internet usage has created huge opportunity for pharma companies to reach the target customers than ever before whether patients /consumers, doctors, hospitals or pharmacies. Customers use web media to gather information and communicate regularly with each other and spend maximum time on web based applications. Pharma industry should exploit this opportunity to interact in digital space which will help to develop stronger relationships, acquire new customers, retain current ones and understand product perception in the marketplace.

E-commerce also continues to gain momentum across all sectors of global industry whether it is mature or emerging markets. Globally consumers look to digital channels for choice and convenience. While some companies are positioning themselves to exploit this opportunity, most of companies are yet to explore digital space. Companies that fail to

leverage sales through digital channels in a timely manner may end up in paying a big price by risking themselves of being unable to engage consumers or capture the market share lost to the companies adopted digital marketing tools earlier.

Marketers in other industries have made a speedy transition to digital space, pharma marketers are comparatively slow to embrace digital revolution. This is because of barriers to pharma's growing involvement on the web, including regulations, budgetary issues, in-house human resource, expertise and lack of monitoring required in order to progress online programs successfully. Hence, it is very important to put in place the processes necessary to identify, conceptualize, implement, track and measure digital activities in order to maximise their potential, justify spend and grow successful digital strategy.

2.5 Cloud Computing & its Impact on Organizational Transformation

2.5.1 Introduction

Cloud computing is the delivery of computing as a service rather than a product, whereby shared resources, software, and information are provided to computers and other devices as a utility over a network. Clouds can be classified as public, private or hybrid. With the significant advances in Information and Communications Technology (ICT) over the last half century, there is an increasingly perceived vision that computing will one day be the 5th utility after water, electricity, gas, and telephone services (Rajkumar Buyya et.al, 2009). To deliver this vision, a number of computing paradigms have been proposed, of which the latest one is known as Cloud computing.

Cloud computing denotes the infrastructure as a ``Cloud" from which businesses and users are able to access applications from anywhere in the world on demand. Thus, the computing world is rapidly transforming towards developing software for millions to consume as a service, rather than to run on their individual computers. At present, it is common to access content across the Internet independently without reference to the underlying hosting infrastructure. This infrastructure consists of data centers that are monitored and maintained around the clock by content providers. Since cloud applications may be crucial to the core business operations of the consumers, it is essential that consumers have guarantees from

providers on service delivery. Typically, these are provided through Service Level Agreements (SLAs) brokered between the providers and consumers (Rajnish, 2011).

2.5.2 Cloud service models

i) **Software as a Service (SaaS)**

In this model, CSPs are responsible for running and maintaining application software, operating system and computing resources. The customer views SaaS model as a web-based application interface where services and complete software applications are delivered over the internet and are accessed via a web browser (Andrew Joint, 2011). Unlike traditional software, SaaS has the advantage that customer does not need to buy licenses, install, upgrade, maintain or run software on his own computer, multitenant efficiency, configurability and scalability. Examples of SaaS providers are Zoho, Google Apps and Salesforce.com (Vania Goncalves, 2011).

ii) **Platform as a Service (PaaS)**

In PaaS model, a CSP provides, runs and maintains both system software (i.e., the operating system) and computing resources. Customer have little or no control over the operating system and hardware resources. PaaS supports collaborative work between members of a project team. For instance, a number of users located in different countries can collaborate in developing a website using a PaaS cloud service. Examples of PaaS providers are windows Azure, Google Apps Engine and Aptana cloud (Andrew Joint, 2011).

iii) **Infrastructure as a Service (IaaS)**

In this model, the CSP provides a set of virtualized computing resources (e.g., network bandwidth, storage capacity, memory, and processing in the cloud. It is the responsibility of the customer to run and maintain the operating system and the software applications on these virtual recourses. Examples of IaaS providers are DropBox, Amazon EC2 and Akamai.

iv) Backend as a Service (Baas)

This model is also known as "mobile backend as a service" (MBaaS). This model provides web and mobile app developers with a way to link their applications to

backend cloud storage while also providing features such as user management, push notifications, and integration with social networking services. BaaS is a relatively recent development in cloud computing, with most BaaS startups dating from 2011 or later (Pankaj Sareen, 2013).

v) **Data as a service (DaaS)**

Like all members of the "as a Service" (aaS) family, DaaS is based on the concept that the product, data in this case, can be provided on demand to the user regardless of geographic or organizational separation of provider and consumer. Additionally, the emergence of Service Oriented Architecture (SOA) has rendered the actual platform on which the data resides also irrelevant.

vi) **Storage as a service (StasS)**

This is a business model in which a large service provider rents space in their storage infrastructure on a subscription basis. The economy of scale in the service provider's infrastructure allows them to provide storage much more cost effectively than most individuals or corporations can provide their own storage, when total cost of ownership is considered.

Characteristics of cloud computing

On-demand self-service, broad network access, resource pooling, rapid elasticity, measured service. The cloud service is a means toward the end of providing a good experience for cloud user. The valuable services should be easily accessed by cloud user. The core of user experience is achieving ease use. Ease use is not only simple but also elegant (P. Morville, 2004).

Key challenges in cloud computing

i) **Security and privacy -** The main challenge to cloud computing is security and privacy concerns of businesses. These risks can be mitigated by using security applications, encrypted file systems, data loss software, and buying security hardware to track unusual behavior across servers.

ii) **Interoperability and portability -** Businesses should have the leverage of migrating in and out of cloud and switching providers whenever they want, and there should be

no lock-in period. Cloud computing services should have the capability to integrate smoothly with the on-premise IT.

iii) **Reliability and availability -** Cloud providers still lack round-the-clock service; this results in frequent outages. It is important to monitor the service being provided using internal or third-party tools. It is vital to have plans to supervise usage, SLAs, performance, robustness, and business dependency of these services.

iv) **Performance and bandwidth cost -** Businesses can save money on hardware but they have to spend more for the bandwidth. Delivering intensive and complex data over the network requires good bandwidth. Many businesses want a reduced cost before switching to cloud.

v) **Cloning and resource pooling -** Cloning deals with replicating or duplicating the data. Cloning leads to data leakage problems revealing the machine's authenticity (Bernd Grubauer et al.,2011).

2.5.3 Cloud computing in pharmaceutical industry

Cloud computing, with its low-cost pay-as-you-grow business model, could potentially help emerging biotech and pharmaceutical organizations companies seek greater cost-saving measures, increased agility, and scalability (Roehrig, 2010).

- **Reduced cost at greater speed**

Early adopters of cloud computing such as Pfizer, Johnson & Johnson, and Eli Lily all used Amazon Web Services (AWS) and Amazon EC2 (Elastic Compute Cloud) (Proffitt, 2009). Adoption of technology and cloud services from the beginning provided these companies an upper hand as they were able to perform R&D using cloud, and process proteomics, bioinformatics, statistics and adaptive trial design more rapidly with predictable time and costs (Davies, 2009).

- **Better connectivity**

Effective connectivity is a major factor in life science research and development (Kubick, 2011) argued cloud computing, using a solitary internet connection, could reduce the effort of individually integrating each research system at various locations yet provide availability to all. (Bowers, 2011) suggested CSPs could provide SMB life science organizations with

best practices they generally could not afford. These cloud CSPs utilize multiple connections to massive networks of interconnected servers that include comprehensive data protection, 24x7 disaster recovery, multi-site replication, real-time monitoring, and state-of-the-art emergency response systems, all from user-friendly, front-end interfaces.

- **Cloud databases**

(Taylor, 2010) also argued that cloud computing and open source software have created a programming paradigm that already has considerable use in the field of next-generation sequencing analysis and in bioinformatics communities. Apache Hadoop, Hbase, and MapReduce are cost-effective software that are reliable, scalable, and distributed. This type of software framework in the cloud provides SMB life science companies with distributed processing of large data sets across clusters of computers using a simple programming model.

- **Cloud Security**

(Sansom, 2010) maintained cloud computing may offer compelling solutions for small companies that struggle with large data sets, but security issues may limit its use in life science research. It was argued that only "precompetitive or non-confidential" data would be used in the cloud; however, CSPs are currently helping small life science start-up companies manage their public and private clouds using Amazon and Google. (Kubick, 2011) suggested a fear of relinquishing control and the term "cloud computing" would cause protests about security concerns, even from current hosted cloud customers. In most cases a CSP provides much higher degrees of disaster recovery and auditable security than most internal IT departments, because cloud computing is that CSP's primary business. It was concluded that cloud security requires risk assessments and that detailed mitigation plans are necessary precautions, which build internal confidence. (Bowers, 2011) expanded on these ideas and suggested data security in the cloud must be strong, extensive, and dependable. Life science companies using cloud computing should consider SAS 70 Type II and ISO-27001 certifications, and ensure adequate security controls are provided in these main areas: application security, data security, infrastructure security, process security, personnel security, and product development security.

- **Regulations**

Besides cloud security, another concern of many life science organizations is typical regulatory challenges. (Kubick, 2011) suggested regulatory agencies and their lack of definitive regulatory positions can negatively influence attitudes regarding cloud adoption, thus making small life science companies wary of cloud computing. CSPs should also comply with Health Insurance Portability and Accountability Act (HIPAA), and Good Clinical Practice (GCP) standards, along with having their cloud services verified by regular audits. Bowers (2011) expanded on these ideas and suggested cloud computing is helping streamline heavily regulated clinical trials by overhauling once labor-intensive procedures into controlled, secure, and efficient processes. Today's clinicians and investigators are no longer shackled by mountains of paper, instead they utilize cloud computing to focus towards data, freeing it to be analyzed, tracked, or instantly reused whenever necessary. Cloud computing requires smaller upfront investment and provides predictable cost management that is based on operating budgets instead of capital budgets, which is particularly attractive to start-up companies. (Kubick, 2011) acknowledged pharmaceutical and biotechnology companies have adopted IaaS and PaaS for computationally heavy research such as molecular modeling, proteomics, and bioinformatics. Cloud computing also reduces start-up times and can be made available much faster than it takes to build infrastructure internally, without bureaucratic hurdles or delays.

A typical Cloud computing model that can be used in ERP is illustrated in Figure 2.13. As the organization grows, the business operations grow which should be supported by integrated cross functional departments like as highlighted in Figure. Traditional ERP has limitations in terms of number of users, performance etc. Enterprise resource planning (ERP) cloud through a network connection can overcome the above challenges. With this, companies can bring down the capital expenditure and achieve better return on investment ROI and shorter payback period by leasing resources and services on the cloud rather than purchasing new equipment and software tools. This is important for small and medium sized companies as their budget is small compared to larger companies (Rajkumar, 2009).

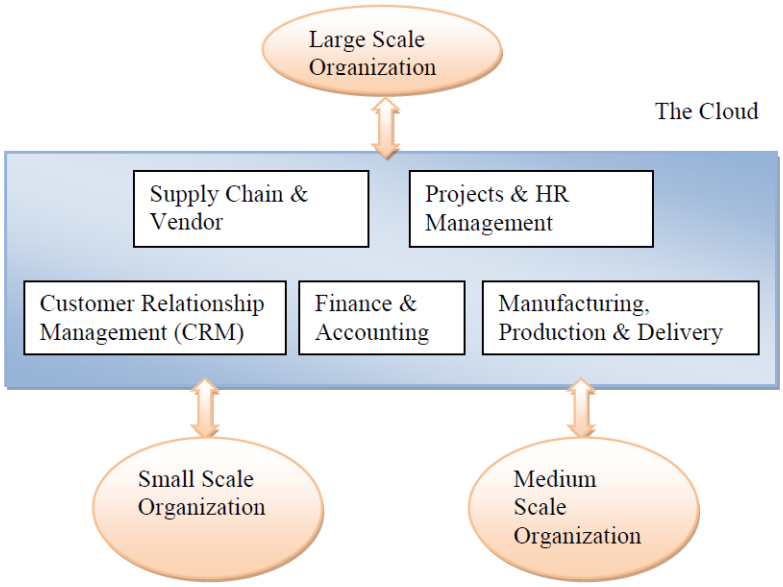

Figure 2.13: Services provided by an ERP cloud model (Rajkumar, 2009)

2.5.4 Summary

The immediate benefits from on-demand clouds seem to provide users with enhanced portability and the capacity to have secure access to information from virtually anywhere, any device, regardless of location or time of day. The small and medium enterprise (SME) life science companies could potentially benefit from this new computing paradigm (Bowers, 2011).

The advantages of cloud computing in the emerging biopharmaceutical companies will help in cost reduction, increase speed of research, improved efficiency, enhanced agility, upgraded storage and data analysis, change management, unmatched collaboration and connectivity, enhanced security, better performance, regulatory compliance, and much greater scalability and flexibility of IT resources (Sommer, Thomas 2013).

2.6 Business Analytics

2.6.1 Introduction

Business analytics (BA) refers to the skills, technologies, practices for continuous iterative exploration and investigation of past business performance to gain insights and drive business planning. It focuses on developing new insights for the business performance based on the data sets and statistical methods (Beller Michael J et.al., 2009). BA makes extensive use of statistical analysis and fact-based management to drive decision making (Galit Schmueli and Otto Koppius – IS Research). Analytics may be used as input for human decisions or may drive fully automated decisions. BA helps to answer questions like why is this happening, what if these trends continue, what will happen next i.e., Prediction, what is the best that can happen i.e., Optimization. (Davenport Thomas H et.al., 2007). The analytics have transformed since their inception with the development of ERP systems, data warehouses and a large number of other software tools and the processes (Davenport et. al., 2007). These days BA is becoming a tool that can influence the outcome of customer interactions i.e., when a specific customer type is considering a purchase, analytics enabled enterprise can modify the sales pitch to appeal to the need of consumer, it means the storage space for all that data must react extremely faster to provide the necessary data in real time (Rahul Saxena et.al., 2012). Depending on any business, the BA could be of four types (Figure 2.14) (Stubbs Evan, 2011)

1. **Decision Analytics**: supports human decisions with visual analytics, so that the user models to reflect reasoning
2. **Descriptive Analytics**: gains insights from the historical data with reporting, scorecards, clustering methods etc.
3. **Predictive Analytics**: employs predictive modeling by using statistical and machine learning techniques for analysis
4. **Prescriptive Analytics**: recommends decisions using optimization and simulation methods

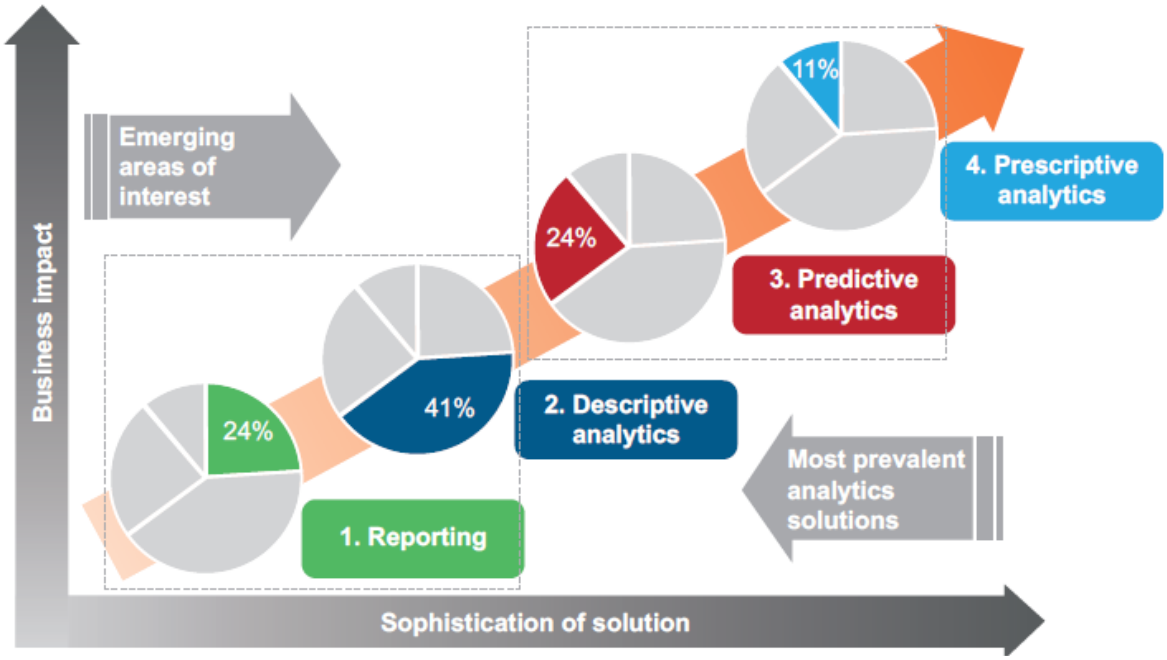

Figure 2.14: Types of Business analytics and its application (Source: Analytics in Pharma and Life Sciences – Everest Global Inc.)

2.6.2 Application of business analytics in pharmaceutical industry

Pharmaceutical industry is one of the few industries where companies create entirely new products every time they set out to take potential drugs or treatments to the market. Pharmaceutical companies can use analytics to aggregate data in R&D efforts to more quickly predict drug development outcomes, thus reducing the costly stages to take new drugs to the market. Predictive modeling can save three to five years of approximately 13 years that it can take to bring a new compound to market and as a part of it, most companies employ biostatisticians (David Shaywitz, 2013).

Clinical Trials are very important in new product development. Organization needs more information regarding patients, doses and the reaction of doses on different patients in different conditions and etc. Due to availability of huge data, organization takes advantage of data analytic tools to identify patients for inclusion in clinical trial. It also helps to optimize innovation, improve efficiency of research/clinical trials and create value from the new and existing data sources by CDISC, ICH, HL7 and 21 CFR Part 11 (Sarjen AT, 2016).

Analyzing the collection of real time data based adverse case reports enables pharmacovigilance. Surfacing safety signals too rare to appear in a typical clinical trial or in some cases and identifying events that were hinted in the clinical trials but that did not have sufficient statistical power. This data analysis could be particularly powerful to help companies avoid drug withdrawals, which hit an all-time high in 2008. Data analysis could be used by pharmaceutical companies to help develop personalized medicine, where genetic variation and specific drug responses are taken in to account in the drug development process so that medicine can be tailored to an individual (David Shaywitz, 2013).

Pharmaceutical marketers are coping with both the exciting potential and daunting challenges associated with Big Data. By focusing on the wealth of data captured from non-personal promotions, inbound and outbound prescriber interactions, the marketers can apply advanced analytics to create a 360° view of their customers to deliver relevant and personalized offers. (Debbie Kenworthy, 2012). Analytics driven strategies would for sure shape the industry's marketing and sales in a more efficient and cost-effective ways. The accessibility of consumer data, combined with tools that can quickly mine the data, will pave the way for more targeted and effective tactics. From physician profiling to programmatic buying, big data is the future of Pharmaceutical marketing (Robin Robinson – Pharmavoice, 2015).

Use of data to determine predictive behaviors helps more accurately identify high prescribers and can evaluate all variables to create a behavioral profile. This method helps marketers to target other physicians who share the same characteristics but have not yet started prescribing highly. These physicians represent high potential, but have yet untapped value and are the most productive targets for promotion (Patrick Homer – Pharmavoice, 2015). Systematic approaches will be needed and demanded, when the marketers are making decisions regarding patient and physician communication vehicles. Content can be generated and delivered in a much-targeted way that allows for evaluation of utility and value of the content to each individual in real sense (Mike Byrnes – Pharmavoice, 2015).

One area where analysis is extremely helpful is the nexus between payer, physician and patient are data analysis. one can look at deductibles and their impact on affordability

through it and then evaluate different offerings and incentives based upon what we believe might be of most benefit to the patient (Cain – Pharmavoice, 2015).

Never before in marketing has one-to-one personalization had co-existed with the ability to achieve the scale. Powered by big data and technology, one can significantly improve the relevance of advertising, by more rapidly and efficiently getting our information to the people who need it and to those who suffer from conditions that can be treated. The challenge for the industry is two-fold: first, to get up to speed with all of the available technology, so that as a sector can be more advanced in appreciation and application of it and second, to stay current with how this ecosystem is constantly and rapidly evolving (DeBacco – Pharmavoice, 2015).

In contrast, a recent survey suggests that 87% of pharmaceutical companies intend to increase the use of analytics to target spending and drive improved ROI. Companies are employing predictive methods to determine which consumers and physicians are most likely to utilize a drug and create focused targets on the ground marketing efforts. Pharma companies have been providing their representatives with mobile/smart devices preinstalled with the analytical tools to ensure real time analytics on their prospects, so that the representatives can tailor their agenda to suit the physician and then afterwards, the sales team can analyze the results to determine whether the approach was effective or not. The Analytics as a service gives the client a 360˚ view of their prospects. CloudMoyo uses advanced analytical models to improve targeting of customers and influence territory strategy through an exchange of customer insights with the field representatives (Nikhil Mirashi, 2016).

2.6.3 Summary

Pharmaceutical organizations enjoy unique proposition by adapting BA. They can strike out the tedious process by implementing analytical tools in order to boost R&D innovation and clinical trials process, deploy accurate monitoring and tracking systems, paving the competitive edge for marketing & sales strategies, sales and distribution channel management. Value proposition is possible by employing the analytics in the organizations spanning in various therapeutic areas, countries along with high amount of transaction.

2.7 Customer Relationship Management

2.7.1 Introduction

Customer centricity has long been a guiding principle for many businesses. On the other hand, it is frequently restricted to marketing prevailing products with as strong a customer focus as possible. The corporate strategy remains basically product- centered. Customers typically have a fractured view of an enterprise. Contrariwise, the enterprise has only a fragmented view of the customer which is determined by different customer contact points, since the customer information is usually protected in departmental silos. CRM has an increasing appreciation and is becoming one of the latest academics as well as practical subjects in the field of business. In fact, due to the competitive setting, CRM is vital and has gained an important place for firm performance (Abdul Alem Mohammed, Basri bin Rashid, 2012).

The competitiveness between enterprises has become more extreme in the 21st century. During the period of economic crisis and industrial structural changes the relationship. In these compelling conditions, the relationship with the customer calls for to be in influencing and progressive approach. By analyzing information from customers and products, a business can provide active and accurate service appropriately for customer satisfaction (Yi-Chan Chung, Shiaw-Wen Tien, Chih-Hung Tsai, Lin-Lin Tang, 2007).

Customer fulfillment is a business viewpoint which tends to the foundation of value for customers, forestalling and managing their expectations, and representing ability and concern to satisfy their requirements (Dominici and Guzzo, 2010). CRM allows firms to develop a strong targeting and inquiry management processes and this helps improve new businesses expressively. CRM enhances customer preservation and faithfulness so as to stay longer, buys more often and thus increase their long-term business value. Simns (2003) maintains that research has indicated that if a firm aligns the management of customers to their needs, it reduces attrition rate by 25% and in the long-term helps the firm to spend less on recruiting new customers to sustain a steady volume of business while cost of sales is also reduced as existing customers are usually more responsive. Zeithaml AV *et al* (2006) believe that CRM provides a social benefit.

2.7.2 Implementation of CRM strategy

The achievement of any strategy is assessed by the triumph with which it is executed. This is also true in case of CRM strategies. Implementing CRM requires that the organization and associated business processes need to be in place in order to enable its success (Brunjes & Roderick, 2002). The organization relying only on technology to implement strategy and not ready to undertake any CRM strategy faces risk in the path of success. Customer service consists of various means of communication such as telecommunication, or by e-communication. (Lovelock, 1991).

Steps in the implementation of CRM strategy

Successful implementation requires specific actions on the part of the organization. The CRM strategy implementation proposed by Peppers, Rogers & Dorf (1999) covers four steps which include the customer's identification, service differentiation, customer's interaction and differentiation among customers.

Step 1: The identification of customers

The customer's identification with unique needs as major contributors to the organization is strategically important. This might require development of a well- updated database to ensure that data remain as updated as possible. With this information, organizations could use various filters and sorting techniques to identify customers who have been with the organization for a longer period and also those who have recently started using the products and services of the organization.

Step 2: The differentiation of service

Customers receive a different level of service and a different product from the organization, depending on the value to the organization. In order to do so, the significantly valued customers are to be identified first by the organization and then provide service accordingly. CLV associated with each customer or sales figures plays an important role in identifying these top customers.

Step 3: Interaction with customers

Various means of communication are utilized for interacting with the customer so as to build a good rapport with the customers. This is crucial since it is only through communication any relationship is built with the customers with respect to their requirements. This involves proactively developing communication methods with customers with respect to the organization's products and services. Advanced Technology can also be made use whenever necessary (Brunjes & Roderick, 2002). The customers considered here need not be all the customers, but only those that are potentially contributing to the organization's success.

Step 4: Customization of products, services and communication

An organization sometimes delivers a customized service depending upon customer's requirements. Communication is customized to address the customer profile and specific requirements. Products can be customized in line with customer's specifications and requirements by the organization. Product package is referred in case of financial services. Main goals of customization is to enhance customer's fulfillment and to unveil the faithfulness of the customers towards the organization.

Technology applications of CRM

A number of applications such as customer service application, customer support application, application of sales power mechanization and enterprise promotion applications belong to Operational CRM (Chen & Popovich, 2003). An important segment of operational CRM is customer call center (Xu & Walton, 2005)(Anon, 2000). All the communications of the organization with customer are archived so as to keep a track on the customer details. A research study conducted in the UK revealed that though the call centers are a key aspect of operational CRM, lesser than 40% of the organizations implemented a call center (Abbott, 2001).

Analytical CRM: Analytical CRM includes the capturing, storage, extraction, processing, interpretation and reporting of customer data stored in data warehouses thereby building a profile/clear picture of a customer. The Analytical CRM thus improves marketing and promotional strategies of an organization by scrutinizing customer behavioral patterns. The results of an UK conducted research revealed that about 25% of the organizations which

were surveyed utilized analytical CRM, which revealed that, the CRM systems prime use is operational by nature (Xu & Walton, 2005).

Collaborative CRM: This CRM uses new and traditional communication technologies to enable customers to interact with organization. Collaborative CRM allows a better level of response to customer needs by involving all the members of supply chain such as suppliers or other partners. Collaborative CRM includes channel strategies or any other utility that delivers a point of interaction (or touch point) among the channel and the customer (Xu & Walton, 2005).

A further category of CRM systems identified is called e-CRM, a web-centric approach, that makes it possible for the organization have as much contact as possible through all communication channels, notably through internet and intranet (Xu & Walton, 2005). The Internet makes it possible to have frequent contact with the customer, and so keep their databases as pure as possible while developing better customer relationships (O'Leary, Rao & Perry, 2004). Advantages of the internet can be perceived by the rapid stream of information and more steady communications (Luck & Lancaster, 2004). By the help of Internet CRM has been increasingly communicable, affecting the developing relationships (Xu et al., 2002). In addition to the above, (Taylor & Hunt, 2002) suggest that the significances of e-CRM may not contribute in achieving the CRM's objectives as acknowledged for a particular strategy.

2.7.3 CRM in pharmaceutical industry

In pharmaceutical industry, CRM and the supporting tools are very crucial. However, the potential of CRM is still far from being exploited in every company, in some cases it even fails completely. These factors include a definition of the CRM objective and strategy, a comprehensive communication of the benefits to be expected as well as a CRM system that meets individual needs of customers in best possible way (Gregor Börner).

CRM 2.0 Best practices

A number of research firms such as Forrester have studied the whole gambit of CRM 2.0 and the possible benefits that companies can gain through its usage. Some of the key findings that describe the best practices to be followed have been described below.

a) Support customer to customer interaction

Companies should actively encourage customers to interact among themselves. There should be less emphasis on institutional support and customers should independently sustain each other.

b) Collaborate with customers

In order to understand customer needs more deeply, companies will have to involve them right from the product development to the product improvement phase. Customers bring with them a huge knowledge base which a company cannot afford to ignore.

c) Monitor customer behavior

With the invent of social media and other internet-based phenomena, companies can much conveniently monitor and understand consumer behavior. This allows them to rise above the geographical and demographical segmentation of customers, relying more on the way, a customer interacts or behave in the society.

d) Social media as a feedback mechanism

Social media such as online communities, blogs and video sharing sites provide a platform for customers to let the companies know about their experience, good or bad, with the companies' product. Companies ought to use such information as a source of feedback and should constantly improve their products or services based on those feedbacks.

Recent trends in CRM tools

Salesforce.com enables companies to monitor conversations about it from within the CRM application. Companies can now collect user information through various social networking sites. In return, these companies collect all the demographic and behavioral information from these users. Salesforce's application can pull information from the social media sites such as Facebook directly into Salesforce CRM application. This allows

recruitment companies and traditional companies as well to operate seamlessly and overcome the issue of customers becoming more and more reluctant to share information on social networks due to fear of being monitored. For instance, Facebook users rebelled against the company when Facebook's Beacon program tried to publish user's buying pattern on Facebook affiliated websites. There were also objections to service providers such as Google. However social networking companies are still evolving and trying to take the narrow path between what is right and what is wrong (Muhammad Anshari, 2012).

Social CRM & pharmaceutical industry

Pharmaceutical sector was slow in 2008 to pick up on social networking but web 2.0 is making its presence felt in this sector. According to a 2008 survey in The New England Journal of Medicine, only 17% of the US' physicians are using computerized patient records. With US Ex-President Obama instructing health records to be digitalized within a span of five years, upgrading in this area is expected to see an improvement. Web 2.0 has allowed patients to form social networks and forced pharmaceutical companies to change their business focus to Patient focus. Health 2.0 and Medicine 2.0 are related concepts and with pharmaceuticals, they are still in its nascent stages. The rise of such technologies has given birth to social patients. Interacting and discussing the issues between the patients in communities and exploring knowledge at wikis. (Shuvam Chatterjee, 2012) The manner by which Social networking has influenced Pharmaceuticals and Health Industry are discussed as follows:

i) Consumers and patients

Patients are increasingly using social networking tools for accessing disease and drugs related information. The usage pattern differs in patients with short-term and long-term diseases. Patients with long-term treatment are more likely to connect to a community in Health 2.0 (Shuvam Chatterjee, 2012). Platforms such as Google Health, CureTogether and MyPenCare have helped create an ecosystem of open source health research system. Besides a knowledge sharing and discussion forum, these platforms allow patients to record their health- related data in a structured format which can be used by medical practitioners for better diagnosis and treatment.

ii) Search Engine Marketing

With the rapid expansion of Health-related blogs, wikis and other social networking portals, more and more search strings direct users to these knowledge centers/reviews. This makes it overbearing for large businesses to take notification and customize their search marketing program with the Web 2.0 result in attention. Specialized search tools are developed by firms to cater to consumer's needs. Clustering engine and Polymeta search powered Scienceroll Search is a medical search engine which is custom-made. Other notable tools are VisualDxHealth: Visual healthcare tools and widgets (Shuvam Chatterjee, 2012).

iii) Radiology Specific Search Engine

The social networking platforms can be effectively used to reach customers in a more systematic way and J&J was quick to note this. Emboldened by its successful implementation of social media tools, Johnson and Johnson launched a channel on YouTube to provide unbranded videos to help people improve their lives based on the vast knowledge possessed by J&J. Thus, Pharmaceutical companies are increasingly using social networking medium as a channel to reach the customers in a multiple way (Shuvam Chatterjee, 2012).

iv) Knowledge Sharing and Collaboration

Doctors worldwide are gradually using forums such as wikis and other for collecting knowledge and discussing. These medical wikis are very helpful for easy preliminary point to do research and help doctors to take organized notes and share their practices and views with other specialists.

v) Health Communication Partnership

Sites like SocialMD (a social network for physicians) and DoctorsHangout.com are bringing the doctors around the world together. This model is founded on providing a free online technology platform that is collaborative, interdisciplinary and transparent. Anyone can contribute and there are multiple ways of contributing. Physicians or Ph.D. in the biomedical field can create a profile and approved Editors get privileges to make changes directly to the Medpedia wiki.

2.7.4 Summary

In a highly competitive commercial healthcare segment especially in pharma industry, negative experience and average service lead customers to switch the healthcare providers and patients to switch to the competitor products or services. The adoption of CRM tools as mentioned above will boost effectiveness and efficiency customer service in healthcare organizations. It is very important for an organization to strike the balance in sharing the prescribing information and patient awareness to make the product or brand a successful one. An efficient CRM strategy will take the pharma companies to the next level.

2.8 LMS and QMS for Regulatory Compliance in Pharma Industry

2.8.1 Introduction

Learning Management Systems (LMS) are becoming an integral part of small, medium and large-scale learning environments and can provide a range of capabilities and features. An LMS allows users to access and deliver training content, leveraging a variety of training media throughout all departments and thus enhancing an organization's knowledge. It also includes tools for tracking and reporting user training performance (K. Martin, 2005). An LMS could perform registration for instructor led training, assignment of instructional responsibilities and setup of courses and curriculum planning. LMS also assists in delivery of tests and assessments, tracking and reporting of trainee's progress and performance and generation of certifications and regulatory compliance reports.

2.8.2 Need of LMS applications for integrated learning

LMS provides a centralized capability to ensure compliance with regulatory agency requirements by easily documenting and providing access to training records for inspections. It was also understood that ultimately all business firms could benefit from the adoption of LMS tools because even non-regulated areas must track and manage training. Below are some of the points that LMS enables the business organizations: (K. Martin, 2005)

- Documentation of training requirements for existing and new employees that also includes requirements driven across the globe from all departments
- Reduction of duplication of training tracking methods involved in the workshops
- Ensuring training compliance meeting standards of business
- Followinf SOPs (standard operating procedures) consistently across all cross functional teams
- Enabling online training venues to reach larger numbers of learners across the organization in depth and width there by bringing down the associated travel and stay costs to company
- Managing rosters for instructor led training who are the point of contacts

With advanced technologies, companies are able to leverage best-of-breed DMS and LMS applications so as to enable seamless SOP management and training Thereby improving the productivity of all job roles involved in the process. The following represent top ten capabilities of well-integrated, modern solutions are illustrated by (Veva, 2015)

i) Real-Time Integration -The documents and metadata changes in the DMS, such as new document version, document title change, etc. are immediately detected by LMS. LMS automatically initiates workflows based on the type of change, for new training assignments or for trainers to review the training item. Real time integration in comparison to a daily file-based batch import offers advantages. It hastens the time of training impacted content created or modified to in use, thereby increasing the operational efficiency and minimizing compliance risk.

ii) Training Item Status Flow -The DMS to LMS integration supports taxonomy mapping, enabling critical document metadata fields to automatically trigger LMS workflows. For example, if a DMS document has a "pending" status, the training manager is allowed to add an assessment via the LMS before making it an "approved" document. Version updates are also automated, enforcing new training assignments for targeted learners when there are new or modified SOPs.

iii) Flexible System Security Roles: Administrative, Approver, Learner - Systems allow a proper definition of security roles in the DMS and LMS. For example, an LMS

administrator with the proper security profile can define training rules such as including an item in a curriculum and adding a re-training period, or a quiz, etc.

iv) Alternative Training Items - The LMS stores a "link" to the source controlled document in the DMS and allows the addition of a classroom event or assessment, which links back to the original SOP training item.

v) Audit Trails - All document activities, including learning and compliance tasks or actions, are the review, logged in detailed audit trails from content creation and approval to training completion and assessment.

vi) Rapid Implementation Time - Cloud integrations have faster implementation times than legacy solutions. To align the DMS and LMS, companies just need to configure the integration to enable the employees and partners to fasten content creation, sharing, and training.

vii) Ease of "Change Control" - With minimal IT involvement, the solution is easily modified to support downstream workflows when metadata in either the DMS or LMS change. Reducing change control costs is a compelling advantage of cloud-based applications over legacy integrations, such as an HTTPS Post Interface, which requires the IT team to manage and maintain business logic.

viii) Accelerated Validation - Companies are always on the latest release with a multitenant cloud. Applications designed for regulated industries simplify validation and facilitate compliance performing IQ/OQ and providing test scripts and other validation documentation on the integration with each release.

ix) Ease of Use - Advanced modern - integrated cloud solutions have a consumer web design providing higher user adoption and a seamless user experience throughout the processes of content creation, review, and approval of training and assessment. Apart from speeding up onboarding time, it also eases to train employees and partners.

x) Visibility into Compliance Risk - Operationally aligning the DMS and LMS solutions enable greater visibility into compliance and risk. Organizations can track SOPs which have been created yet not trained on and determine which SOPs have poor assessments and also the performance with new versions of the critical document.

As the industry faces increased globalization, product supply chain complexity, and regulatory enforcement, Life Sciences companies need to demonstrate to auditors that they are in full control of their GxP document and training management programs. A (USFDA 21 CFR Part 211) study revealed that 50% of 483 CDER observations in 2015 were procedural related, with "Procedures not in writing, fully followed" (21 CFR 211.22(d)) as the most cited observation for pharmaceutical companies by FDA investigators. Organizations are required to improve both document management and training record management as there is an increasing focus on GxP procedural issues by the regulatory agencies. Many companies have invested in "best of breed" Document Management Systems (DMS) and LMS. For greater visibility and consistent operation, a DMS and LMS governance model are often established to define critical business processes including how to apply nomenclature, use system security roles, and manage impact from new releases. When the above applications are well integrated, it is easier makes it easier for the organizations to enforce good governance, streamline the document creation, review, and approval to training distribution and receipt process.(Veva, 2015)

2.8.3 Role of QMS tools to build efficient quality systems

The Article 2 of the World Health Organization (WHO), highlights one of its essential functions –"develop, establish and promote international standards with respect to food, biological, pharmaceutical and similar products." Although, every government globally allocates a substantial contribution to medicines from healthcare budget. However, without assurance of the quality, safety and efficacy these medicines are relevant to priority health needs. In developing countries considerable administrative and technical effort is put to ensure patients receive safe and effective medicines of good quality. It is one of the major objective of Health ministries to implement a reliable system of medicines control be brought within the reach of every country (WHO, 2007).

Quality of the product is built by implementation of efficient and robust QMS tools. This will have a profound effect on overall performance of the system resulting the high-quality product contributing to the growth of the company (Lakhal. L *et. al*., 2006) Considering the need of consistent quality and global competitiveness, the concept of current pharmaceutical quality management system is based on an internationally harmonized

guidance ICH Q10, which is developed by the Expert Working Group (Quality) of the International Conference on Harmonization of Technical Requirements for Registration of Pharmaceuticals for Human Use. (Neetu Dubey et al, 2011, Lachman L, Hanna SA, Lin K., 1976)

(Maxine K. Fritz**,** 2013) quotes that there are Six Subsystems of a Pharmaceutical Quality System. It looks like the hub and spokes of a wheel. The quality system itself is at the Centre (the hub), but it is connected to five other manufacturing systems (the spokes). When quality system as a subsystem at the Centre of it all, the six subsystems of a modern pharmaceutical quality system are

- Quality System
- Production System
- Facilities and Equipment System
- Laboratory Controls System
- Materials System
- Packaging and Labelling System

As per (Master Control) quality and compliance software tools are designed to meet the regulatory guidelines, market needs etc. These tools are developed to facilitate compliance with GxP regulations (FDA, MHRA, EMA, and MHLW) and standards (ISO, European Union GMP). As identified by a leading QMS consultant (Master Control) below are some of the QMS tools available and used in pharmaceutical industry.

Document Control - Documents are the centrepiece of pharma company's quality management systems. A QMS tool automates all documents based and forms based processes. It also automates day-to-day tasks such as routing, follow up, escalation, and approval of documents. It can provide a centralized location for all documents and records, making search and retrieval easy.

CAPA Management - CAPA management is essential to any QMS function. This tool automates, streamlines, and effectively manages the CAPA process across functions. It

provides best in practice forms and workflows, including “8D” process. This will guide every step of a CAPA implementation.

Training Control - Training automates distribution and monitoring of training needs, tasks and online grading of the tests. This module has the capability to sequence the training and automatically updates on prerequisite course and next training. Effective and continuous training is a necessary component of a compliant company's QMS.

Audit Management - Audit management streamlines the audit process by automation of all recurring tasks, which includes scheduling of audits, preparing and sending out the assignments, and also tracking tasks. This module provides best in practice forms for gathering and tracking basic information and tracking audit findings. It is the robust tool for managing and conducting regular audits.

Risk Management - Risk management standardizes the process for collecting and managing tasks pertaining to risk management in various departments. It automates review, approval, and execution of tasks based on the hierarchy designed by the company. It also populates analytics and reporting tools for faster and effective risk analysis.

2.8.4 Summary

Pharmaceutical industry is one of the most monitored and regulated sector amongst other industries LMS and QMS play important role to build pharmaceutical products that are safe, effective and of high quality. This holds good for both bulk drug of finished formulation. In the literature survey, many Indian and global pharma companies were studied with respect to the latest digital tools adopted for their success in global markets. It was found that all companies operating globally use QMS and LMS very efficiently and they continue to credit their success to these tools. The understanding and implementation of appropriate LMS and QMS applications and models enables a pharmaceutical organization to fulfil its ethical responsibility as well as to comply the regulatory requirements. Investment in implementation of these tools makes good business sense.

2.9 Automation in Manufacturing and Supply Chain Operations

2.9.1 Introduction

The term automation, inspired by the used word automatic which was widely used before 1947, when General Motors established the automation department (Rifkin, Jeremy 1995). It gained importance when the industry started rapid adoption of feedback controllers, which were introduced in the 1930s (Bennett, S. 1993).

Role of automation in the manufacturing sector is on rise in recent years. In today's competitive world, process driven manufacturing industry serves to improve cost effectiveness, quality, safety, environment friendly, timely delivery and thereby enhancing the customer satisfaction. Process automation leads to produce high volumes of product to meet high demand in emerging markets. Manufacturing sectors like chemical, pharmaceutical, engineering, electricity and petrochemical industry are swiftly moving towards automation. There is a huge demand for Information Technology Enabling Companies (ITES) to design and implement hardware, standard software and services of process automation in the pharmaceutical industry. The latest technologies like ERP is widely used that can enhance the efficiency of manufacturing and quality and also supply chain and logistics management is integrated with the adoption of ERP. This will give the real-time demand and supply management to optimize the inventory management. Another tool that has been considered for automation is Robotic Automated Storage and Retrieval System (ASRS) in manufacturing area which will improve faster and accurate warehousing.

2.9.2 Automation evolution and challenges

Automation is not a new phenomenon and the evolution of the automation began with where there was a huge requirement of labor and also the less regulated industry was able to adopt the automation in the early years. Later the automation was widely adopted in other sectors which are more regulated in nature. Applications and successful adoption of automation in various industries is briefed below:

Food and drinks – Automation is used in food retail industry to apply automated ordering process. For example, Domino's pizza introduced self-ordering and payment systems in its restaurants and thereby reducing the need for many employees as cashier. Online ordering also helps for faster service to customers (David J Hill, 2012). General Packet Radio Services (GPRS) enables the delivery system for online orders gives real time data and enhances delivery speed. Some restaurants also use wireless devises on the tables for automated food ordering and delivery to customer's tables done through robotic and conveyor system (ICR Touch).

Retail and Online Retail Stores – Across the world, many Supermarkets and smaller stores started using automated dispensing machines of the products to reduce the need for employing workers. Online shopping conglomerates like Amazon, Flipkart are using hub and spoke model to enhance their delivery through the nearest warehouses. Automated barcode reading system, 2D bar codes also used to avoid wrong deliveries to the customers and for identifying the product post-delivery.

Automated mining – Essentially mining industry requires huge labor force there by cost increase in cost of operations. Automation brings down the reduction of human labor from and mining industry is in the transition towards Automation. However, it requires a large amount of investments for Automation in this industry. In the third world countries where labor costs are low so there is less incentive for increasing efficiency through automation (Australian mining, 2015)

Automated video surveillance – Automation through video surveillance will help in most of the functions like manufacturing, warehousing, transportation, bar code reader on packaging conveyor belts will help to record any incidents with the real time information for immediate actions (Javed O, 2008).

Automated highway system - Rapid Transport System (RTS) and Intelligent Transport System (ITS) assists the drivers to know the traffic conjunctions. It helps warehouse team understands the real-time status of the delivery vehicles leads to speedy logistics management. It improves the efficiency of overall operations management. Fully

automated highway roadway, metro rail corridors, Global pocket radio system shall accommodate installation of equipment in new and existing motor vehicles will help the drivers to navigate and deliver fast. (Menzies, 1998)

GPRS helps system administrators to monitor the speed of the vehicle and alert the drivers for less or more speedy driving on real time basis regularly. Automated controls also improve road safety by reducing the driving errors which is the reason for most of the accidents on road. There are other potential benefits like improved air quality as a result of more-efficient traffic flows improves fuel economy.

Automated waste management – Waste management is one of the important functions in industrial sector to control pilferages and pollution. Automated waste collections bays which can be controlled through the vacuumed sucking system will bring down the manpower requirement because the waste is collected at centralized collection point. As a part of green initiatives and ecofriendly policies, most of the manufacturing companies started using the waste to convert as power, gas which can be utilized domestic consumption as a renewable energy (Hepker, Aaron, 2012).

Home automation - Automation at homes is on steep rise due to the availability of various digital tools. In recent past like electrical equipment like air conditions, water heaters, room heaters, controlled through the mobile applications.

Industrial automation – In 21st century, industrial automation is the need of an hour to compete in global markets. Irrespective of the sector, companies are moving towards automation to bring down the costs, increase the productivity, improve the efficiency, on time deliveries etc. Process automation is mainly in manufacturing, quality control and warehousing which helps an organization to increase their accuracy levels (Noble, D. F., 1984).

In industrial automation, departments like manufacturing, quality control and material handling adopt the automation tools. Recent trend has shown the steep rise in the usage of machine vision for automatic inspection. Robot guided functions are also used rapidly across the industry.

Manufacturing planning and execution is fully integrated through enterprise resource management system. Figure 2.15 illustrates the SAP process flow.

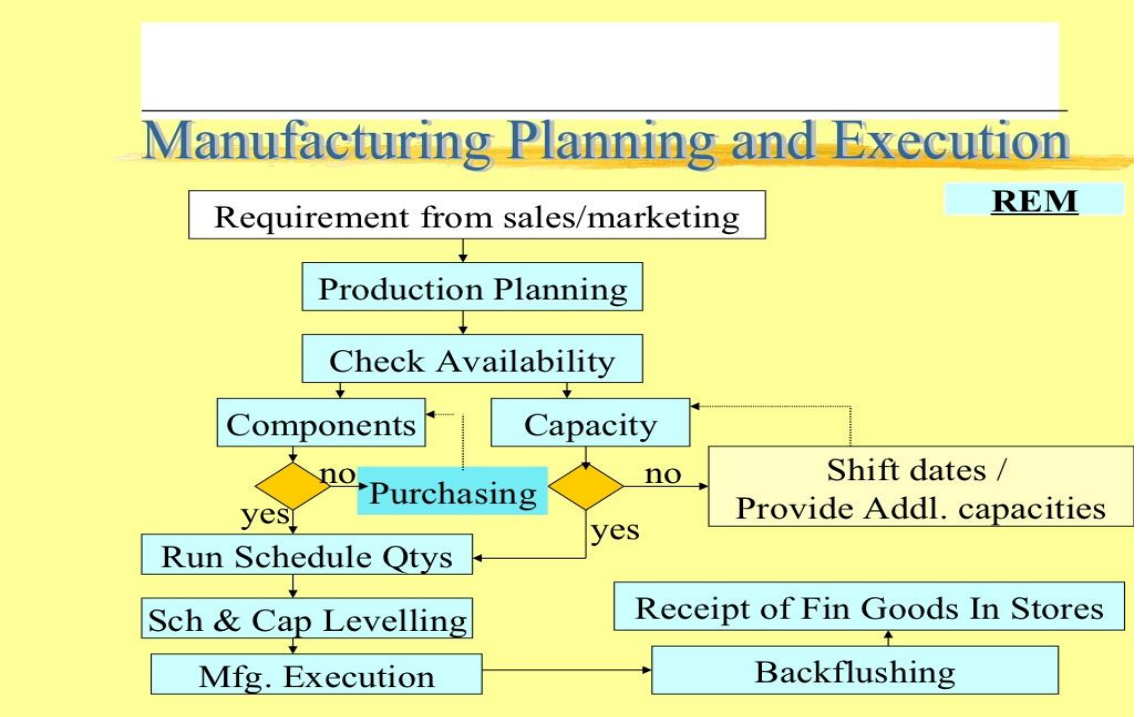

Figure 2.15: Manufacturing planning and execution process flow by SAP

Limitations of automation and relationship to unemployment

Many roles for industrial processes sometimes lie beyond the scope of automation. Human-level pattern recognition, language comprehension, and language production ability are seen to be beyond the capabilities of modern mechanical and computer systems. Tasks which require subjective assessment or synthesis of complex sensory data, such as scents and sounds and high-level tasks such as strategic planning, currently require human expertise. In many tasks, human labor is more cost-effective compare to the automation costs.

As researched by (Saint-Paul, G., 2008), an economist at Toulouse University, the demand for unskilled human capital declines and demand for skilled human capital increases because of the automation. In the long run the automation would help the society in various aspects like affordable products, efficient services, lower average work hours, and

formation of new industries like robotics industries, computer industries, design industries, etc. These new type of industries create lot of job opportunities, skilled employment with better salaries to improve the economy.

Phases of Automation process

As discussed by (Slava Gerovitch) on the major phases of historical development and socio-economic aspects of industrial automation, focusing on the computerization of production, engineering, and managerial tasks. It is important to understand the evolution of automation globally and below are the phases of automation in all sectors of industry.

Phase I: Mechanization and Rationalization of Labor

Over decades, industrialization has grown rapidly with challenges in the availability and cost of the labor. This has forced industrial sector to look beyond the manual labor and automation has become topmost priority for the industries. Mechanization replaced human or animal power with machine power. But there is requirement of workers to run the machines as they were not automatic but controlled by factory workers.

Phase II: Automation of Production

After the mechanization era, there was a rapid use of automation using various tools. This was due to globalization which opened cross border trade and increase the demand for products and services. Automation in manufacturing is done through programmable logic controller (PLC) and its pneumatic controls system.

Phase Ill: Computer-Aided Manufacturing (CAM)

Post-automation, manufacturing industry has adopted Computer Numerical Control (CNC) systems through computer aided design with distributed control, in which each the machines were controlled by its own microcomputer. This blending of information and production technologies produced a new breed of machinist programmer who could operate CNC equipment by generating and debugging NC programs. To approach the human level of flexibility, robots were supplied with sophisticated techniques of feedback, vision and tactile sensors, reasoning capabilities, and adaptive control.

Phase IV: Automated Engineering

CAM applications basically tend to be industry-specific and proprietary. With the introduction of Computer Aided Engineering (CAE) systems for standard techniques of engineering analysis, the whole range of engineering tasks from conceptual design to analysis to detailed design to drafting and documentation to manufacturing design became automated. The roles of blue collar and white-collar jobs were further narrowed, as engineers, clerks, and managers became integrated in an automated office.

Phase V: Automated Management

Automated management was installed by GE in 1954 to automate basic transaction processing, payroll, just in time inventory control and material scheduling, billing and order service, and general cost accounting. These functions basically process huge amounts of data generated in mass production and mass marketing. These inputs provide management with data, models of analysis, and algorithms for decision-making. They eventually became a standard tool for operation control, management control, and strategic planning.

Phase VI: Computer-Integrated Manufacturing (CIM)

CIM is the combination of flexible automation tools like robots, numerically controlled machines, and flexible manufacturing systems. They integrate production systems that cover the complete operations of a manufacturing company including purchasing, logistics, maintenance, engineering, and business operations. CIM underlines horizontal links between cross functional departments of the company and provides the option of sharing data and computing resources, making it possible to break the traditional institutional barriers across the departments. This will create the flexible functional groups that will enhance the performance, speed and efficiency.

2.9.3 Automation in pharmaceutical industry

Post automation era many chemicals were made in number of batches. With the widespread use of instruments and the emerging use of controllers, the founder of Dow Chemical Co. advocated to all levels of the company to go for automation for continuous production to

improve the efficiency, yield, quality and bringing down the cost of goods (Bennett. S, 1993).

Pharmaceutical industry is in the forefront of healthcare sector. Major divisions of the industry are retailing, distribution, manufacturing, sales and marketing. Automation across all the verticals helps company to be more efficient. Automation in retailing and manufacturing is in the subsequent sections.

Manufacturing and quality related systems are the key factor in drug product quality. Technological innovation has meant increased emphasis on computerization and automation of processes in various functions. The concept, design, development and production of automation for pharmaceutical industry must adhere to the regulations imposed by an agency. In biopharmaceutical industry manufacture, validation requirements for processes and critical systems that can affect drug quality are substantial. The regulatory agencies from various countries have contributed to additional engineering requirements that systems must comply with in order to support validation. The requirements for manufacturing plants and systems have grown and have pervaded the lifecycle of their systems. These are mainly in the form of hardware and software design requirements like cloud based software and system validation requirements. Vendors into these industries must be able to support these two requirements, evidential design for purpose and validation (Felkey BG, 1996).

Automation of Dispensing Systems at Retail pharmacy

Post 1980s, automated dispensing devices started to become popular, a generation after the invention of unit dose dispensing. The invention and application of these devices have improved the dispensing practice with reduced rates of medication errors. This has resulted in increased efficiency of pharmacy and nursing staff, ready availability of medications depends on the usage and managing inventory and billing functions of pharmacy. Automation is very important tool in dispensing systems at retail pharmacy, hospital pharmacy, clinical pharmacy and overall pharmaceutical industry. Few of the areas where the automation has been used recently is given below (James KL, Barlow D, Bithell A, *et al,* 2013)

Pharmacy Based ADS (Murray MD, 2000)

- Medications are stored on designated shelves and identified based on bar code reading or product code and it also calculate the space on the shelve to maximize the space for more drugs
- After the entry of the dispensing order, Robotic arm picks the selected pallet from shelf and transfers to delivery station
- Finally, the checking and labelling is done by registered Pharmacy staff

Ward Based ADS

- Medications are stored in electronically controlled cabinet which linked to computer
- To access medications, nurse enters password and patient details
- Drawer containing selected medications opened and Nurse administers medication
- System also tracks the name of the person accessed the cabinet and for whom medications were given there by ensuring the authenticity

Automated Unit Dose Dispensing (Guerrero RM, 1996)

- Medications are stored in calibrated canisters in pharmacy
- When the pharmacist enters the dispensing order, ADS eject the medication from the canister into strip packing device which labels and seals the strip before it is given to patient

Smart Camera system which is a new approach of track and trace, smart camera vision systems can more cost effectively address ID code reading, text verification, mark quality assessment, label inspection, and general inspection applications (Javed O, 2008).

Applications of robots in pharmaceutical industry:

In the pharmaceutical industry, robotics plays a vital role the complicated and sophisticated processes of research and development, production, and packaging. Robotic technology

implementation can be justified from improved worker safety to improved quality. Another important activity is speeding up the drug discovery process which is a key driver for a pharma company and can be achieved by Robotic technology. Lot many robot manufacturers have designed products to meet the specific needs for the pharma industry and below are some of the robotic tools used in various departments of pharmaceutical industry (Mahaveer, 2011).

- **Research and Development (R&D):** In the development of new drugs robotic technology plays key role. In case of High Throughput Screening (HTS), millions of compounds are tested to determine which could become new drugs. In these instances, to test millions of new entities robotics could be used. Robotics can shorten this process because they can be replaced with the humans repeatedly.
- **Laboratory Robotics:** Use of laboratory robotics would help humans to focus on sample submissions and selection there by generating better data and reduced costs. They also help in new experimental procedures there by eliminating human tedium and miscalculation in washing and transferring which includes experiments in radioactive, fluorescent, and luminescent analysis. Application of Laboratory robotics has been on rise in pharmaceutical development to help meeting the market need to increase in productivity, decreasing drug development time and there by bringing down the overall cost of drug development.
- **Control Systems:** Robots are monitored with the use of onboard controllers that communicate with other machines Programmable Logic Controllers (PLCs) or with Personal Computers (PCs) networked to the line. Robot controller is an industrial VME bus controller that connects to PCs for networking and for graphical user interfaces.
- **Vision Systems:** This tool is a valuable in pharma industry for determining the accuracy of text and graphics in pharmaceutical and medical packaging departments. It also increases the speed of vision system by the inclusion of Robotics and it can inspect the pack inserts in less than 2 minutes and the same vision inspection would take more than 30 minutes by the operators
- **Sterilization and Clean Rooms:** Robotics can be adapted to work in aseptic environments where minimum human intervention is required to maintain the aseptic

condition and particle moment. Clean room robots come with advanced features that protect the sterile environment from chances of potential contamination. These robots come with hi-tech features like low flake coatings on the robotic arm, stainless steel fasteners, special seal materials, and enclosed cables. Clean room robots reduce costs there by automating the inspection, picking and placing, or loading and unloading of process tools. Benefits of robot use in the clean room like reducing the scrap contamination, minimizing the clean room bunny suits, reduce costly clean room space because of less human requirement and permits relaxed cleanliness throughout the plant.

- **Flexible Feeding:** Robots score better than hard automation at flexible feeding, a task that involves management of multiple types of products and packages whose orientation always varies. Traditionally, packaging departments have used high speed, automated bowl feeders that vibrate parts and feed them to fillers, labelers, or product transfer mechanisms. Sometimes bowl feeders, can't always handle a variety of products at once, and their vibration can damage fragile parts. Robots can be ideal choice in these cases
- **Packaging Operations:** Automation brings speed, repeatability, accuracy and reliability in the packaging function of pharmaceutical company. In some packaging functions like carton loading, robotics also performs more efficiently than the respective machines. Pharmaceutical packaging machines are often custom designed to handle specific product configurations such as vials, ampoules, bags etc.

In nut shell automation through robotics helps the industry to move in to modernization of the operations.

2.9.4 Summary

The importance of automation technology continues to increase in the manufacturing industry. The barriers between information, communication and automation technology gradually disappearing in the operational context. With the invention of latest technologies like wireless networks, fieldbus systems and asset management systems have helped the industry to increase the efficiency of process systems.

In the pharmaceutical dispensing sector, the implementation of Information and Communication Technologies (ICTs) in the pharmacies over the last decades has entailed the possibility of using Automated Decision Support Systems (ADS). With the use of automation support tools undetected problems can be identified, thereby minimizing the dispensing errors, improving the patient safety and bringing down the direct and indirect healthcare costs. In the pharmaceutical manufacturing context the quality practices, regulatory practices and business performance are inter-dependent on each other and automation will improve the overall efficiency of the operations. With the rapid rise in ageing population there is urgent need of new drugs and devices and use of robotics systems will improve overall productivity and efficiency to meet this growing demand.

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

3.1 Research Question

Globalization draws most of big companies into the market. In the global markets, MNC giants have well established brand image, existing market, branded products with huge resources in terms of finance, technology and market knowledge. They tend to put tremendous pressure on Small and Medium Enterprises (SMEs). Since SMEs lack the necessary financial, technological resources, they tend to suffer in the market and survival becomes challenging every year passes. Besides financial and technical expertise, the SMEs are weakened by several other factors that plague their success as mentioned below:

- Lack of adequate expertise, training and finance for technological upgradation, product portfolio expansion and market entry
- Inadequate resources to implement of GMP to meet global regulatory and quality standards, limited exposure and expertise on IP and Patent related issues
- Limited adoption of information technology techniques in production, marketing and other processes of the industry
- Low or negligible R&D expenditure which impairs the ability of SMEs to offer innovative and differentiated products
- Lack of market knowledge, less acceptance of the products when compare to the MNC's by customers, regulatory and market barriers etc.

Furthermore, with globalization, the market becomes very vast and hence most companies look forward to operating beyond their boundaries. As of result of all these factors, many medium sized Indian pharmaceutical companies have moved some segment of their operations to larger markets globally. While globalization has increased the business scope, it has also intensified threat to the businesses to competition.

A larger market is always a preferred option for many small and medium players as it offers several advantages and disadvantages at the same time as its own limitations for the companies as highlighted in Table 3.1. Due to improper resources and lack of proper knowledge on one hand and fear of adopting new technologies, the small and medium sized companies face many challenges. They find it very hard to adopt everyday changing technologies. A quick adoption of right technology at right time for sure would save these companies from larger disasters and huge losses (Ollman B, 1999).

Table 3.1: Opportunities and Limitations of larger markets

Opportunities	**Limitations**
• Relatively low competition in some markets. • Cost: Indian pharmaceutical companies could offer inexpensive products thereby boosting overall sales. • Quality: Indian Pharma companies could offer better quality products at competitive prices.	• Financial constraints for investment for growth engine. • Lack of innovative products and technology to compete with the established companies. • Lack of branding: The brands of small and medium companies face big challenge with global branded companies as they are not very popular.

Due to non-availability of resources and lack of awareness, proper knowledge on one hand and fear of adopting new technologies, the small and medium sized companies face do or die situation in global markets. These companies find it difficult to identify the ideal digital platforms meeting the business requirements to compete with the regional and multinational branded and generic companies in the overseas markets. After a detailed review of literature through secondary sources, interaction with industry experts and academicians, researcher recognizes the problem and of the opinion that an adoption of right digital tools can make the mediums sized companies competitive in all verticals. Based on the above problem statement, researcher has set up objectives for this study, setting the Hypothesis and developed the research strategy, design and methodology suitable for this research.

3.2 Objectives of the Study: After the detailed literature review, research gap and the problem statement was identified. Based on that below mentioned objectives are set.

1. To study how the Globalization and various environmental factors unfolding the opportunities in international markets for Indian pharma companies.
2. To study whether digital strategy can be exploited by Indian pharma companies particularly the medium size companies that may have resource constraints to go global using the new medium as a competitive tool.
3. To find out with the help of primary and secondary research whether the idea of adopting Digital Strategy can improve the performance across various functional domains of the company.
4. To find out the motives and to understand the relative importance of various motives that lead to competitive advantages that a medium sized firm aim through implementation of digital strategy.
5. To highlight the various digital tools, platforms, technologies available and analyze how pharma companies have become successful after the implementation of these tools.

3.3 Hypothesis of the Study: Below mentioned hypotheses was arrived after setting the objectives for this research.

1. Medium sized pharmaceutical companies are capable of implementing cost intensive digital platforms.
2. Pharmaceutical companies will succeed if they embrace the technology based solutions and incorporate it as their strategic options across functional domains.
3. Digital marketing is essential for pharmaceutical companies.
4. Digital strategy is the need of the hour as well as future and it should be considered as a corporate strategy.

3.4 Research Methodology – Phase 1

Considering the nature of the research, problem statement, objectives, hypothesis and the research design was established. Research is done with an aim to collect the data through online questionnaire from the participants using purposive sampling technique. Detailed stepwise approach to this research is highlighted below.

i. Research setting

The setting is the pharmaceutical profession and all the data collection was carried out in India. However the data was also collected from overseas professionals who had an association with Indian companies. India being the fastest growing country in healthcare field comprises mixed set of population supporting research. Careful and disciplined step wise approach was adopted for this study as mentioned below in Table 3.2.

ii. Research steps

A) Sampling:

- Targeted expert pharma professionals from various domains across India and overseas working in sales, marketing, BD, SCM, etc.,
- Heterogeneous samples from different age groups, qualification, experience, size & type of companies

B) Data sources

- Primary data – Quantitative questionnaires sent using google doc application through mails. Follow up was done using digital tools like emails, LinkedIn, WhatsApp etc.,
- Secondary data – Research & review articles from online journals, company websites, financial reports, market reports, business analytics, and news articles using internet as a major search.

C) Data collection tools

- Google doc tool was used to send and receive the questioners
- Data was extracted to XL format; Converted in to tabular formats
- Used Pie charts, bar charts and other graphical tools for analysis purpose

iii. Study Design

Table 3.2: Illustration of primary study design and steps – Phase I

Total number of professionals identified in to participate in this study	245
Total number of participants agreed for the participation to fill the questionnaire	140
Total no. of participants filled the questionnaire as per the guidelines	80
Participants source and background	Pharmaceutical professionals with well-known experience and expertise
Target markets	India and international
Survey mode	Online through email link and offline
Survey Language	English
Questionnaire type	• Total 41 questions • 4 – Basic information • 14 – Demographic characteristics • 27 – 4 Direct questions with Yes/ No/ Can't say option; 23 with multiple choice, multiple click option
Sampling	Random, voluntary (no honoraria), no control group
Period of Study	7th Jun'15 to 27th Jun'15

The survey research method has been chosen to study and understand whether the technological transformation is required for medium sized Indian pharma companies to enter and sustain in global markets. The sampling technique has been described followed by the measurement procedures. The survey instrument has been customized to this study.

iv. Sampling methods, sampling size and justification

Sampling technique used in this study is on convenience sampling. Participants in this study consisted of people who were presumed to have first-hand knowledge, or were in a position to know about the topic. This type of sampling allowed the researcher to

appropriately select a sample determined by the population's expertise (Babbie, 2004).

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The major challenge in getting the participants for study is, Pharma industry is innovation and technically driven domain and majority of the companies have strict compliance for the employees to share the information even though it is general in nature. Hence the researcher had problems in convincing the professionals to enroll in the study. However due to the researcher could approach right and genuine participants due to the domain experience and contacts.

The participants were selected on the basis of the knowledge, connection and judgment in the Pharma companies. It was through the personal and work relationships with the sophisticate employees to ensure the participation and completion of this survey, among all of them were managers, general managers, vice presidents and top management cadre of the Pharma companies. The participants of this questionnaire based survey were pharmaceutical professionals who worked directly with companies and were not from third parties.

After extensive study of various articles, preliminary question model, structure and first set of pilot/ test questionnaire was prepared. Pilot/ test questionnaire was shared with some of the academicians and around 25 industry specialists from the target participants in the related area to understand whether the questions could help to get the desired information for the research topic. Based on the inputs received from the experts the final questionnaire was prepared and structured to make it more interactive as well interesting to the target participants. Time required to fill the questionnaire was also tested as most of the participants in the study are busy professionals and it could lead to the non-participation in spite of the initial agreement. Standard test time required was around 45 to 90 minutes in the pilot/ test questionnaire. Hence the researcher assumed that it requires minimum of 60 minutes to fill participate and fill.

Researchers while deploying the qualitative method, frequently takes in to account the number of interviews required i.e. the sample size to be employed for the study. The riposte to this, depends on the epistemological, methodological and practical issues taken in to account to validate within the epistemic communities, availability of time and resources

when conducting a research (Sarah Elsie Baker & Rosalind Edwards, 2012, NCRM).

The National Council for Research Methods Reviews (NCRM) provided a series of renowned voices of experts (Social Scientists and Researchers) to answer the considerations of sample size into the account. It includes, the following experts' voices;

- A variety of factors can influence the number of interviews to be conducted for a piece of qualitative empirical research in academic thesis. According to (Patricia A. Adler, 1987), a small number of cases/subjects may be extremely resourceful for a research project and this is true for studying the deviant or elite populations. Here a relatively few people between six or a dozen may offer insights into things as the gang of motorcyclist or corporate boardroom members i.e. gaining access among the people of these groups.
- There are 3 types of research where larger sample size may be easier to seek. First is when subjects are easy to find and plentiful, such would be the case with research conducted on a built-in/peer approachable group for scholars (Adler and Adler, 2011). Second, when the population groups are discern within a setting with varied perceptions and status/role regarding the scene (Vecitis K.S, 2011). Thirdly, subjects are easily sought in large numbers in certain circumstances of funding resources and required "n" is of 100-120 (Murphy and Rosenbaum, 1988) and sometimes due to lack of sample set observation criteria, larger sample is deployed to probe the subjects towards the data as the project evolves (Fine G.A, 1998).
- But, the number of people required to make an adequate sample for a qualitative research project can vary from one to a hundred or even more. However, when the length of time is considered, this type of research often takes the difficulty of gaining entry to even the most mundane group/setting and the difficulty in transcribing the interview schedules relies on the publish or perish world in which we live and utmost, our best fit is to advise in the broad range of between a dozen and 60, with 30 being the mean (Patricia A. Adler, 2011).
- As per the opinion of Julia Brannen, University of London (2011), the sample size of 40 would be sufficed for Doctoral research. But the number shrunk for varied reasons

like inclusion of particular case and the purpose of research as in the type of research question to be addressed and methodology to be adopted.

- Alan Bryman (2012) expressed that how large sample should be opted for qualitative research as the question arises in the aspects of few factors like saturation, research domain and heterogeneity of the population.
- Researching till saturation point is a challenging approach as it forces the researcher to combine sampling, data collection and analysis rather than considering them as separate stages in a linear process. However, as the saturation is ideal, sample size of 50 would be appropriate for a Ph.D thesis (Alan Bryman, 2012).
- The sample size requirements range from 60-150 in the qualitative studies based on the research domain criteria (Gerson and Horowitz, 2002). The population may be quite heterogeneous with a good deal of sub-group variability and it is possible that a researcher wants to capture at least some of this variability in view of the likelihood of the sample and that will be associated with significant variability in experiences and world views of participants (Alan Bryman, 2012) and the sample size would be around 100 (Andrea Doucet, 2006).

Based on this entropy of literature sources and also considering the challenges in getting the participants, the sample size of 100±20 is substantiated for this research study.

v. Measurement procedures

The method of e-mail survey is used in this research due to the unique characteristics of the study population and the efficiency of data collection. Being a qualitative study, the survey was consisted of close-ended questions formulated aiming to ensure more in-depth information is provided. The questions were formulated based on the objectives, research question and hypothesis of this research. The questions follow a logical progression starting with simple themes and progressing to complex issues to sustain the interest of respondents and gradually stimulate question answering.

The design of the study was cross-sectional in nature as it was designed to find out from a cross-section of sophisticated employees in pharma companies regarding the technological

transformation is required for medium sized Indian pharma companies to enter and sustain in global markets. The basic approach of this survey was to facilitate in a hassle free way to complete in office or in home.

vi. Data collection

The questionnaire was a closed one and the answers must be chosen from the given options. If the data to be collected is qualitative, it may be that no formal questionnaire is needed (Crawford, 1997). The questionnaire would be posted online as well as manually distributed.

Each participant received an E-mail with an Internet link embedded in the body of the text. The subject line of the email had a specific message reading the following: 'Digital Strategy in the Globalization of Medium Sized Indian Pharmaceutical Companies' and the main body of the E-mail included an introduction with specific instructions for the questionnaire. The participant was expected to click the link and was directed to the questionnaire created and posted on the web survey site – Google Forms. Researcher used both social and professional network pages such as LinkedIn, Facebook, and Twitter etc. to remind the participants. The researcher also visited some senior executives in various locations and explained the purpose and got the questionnaire filled in. Approximately 10 to 15-minute semi-structured interviews were conducted as narrative inquires with a few from each target groups in order to have a detailed note on their perceptions.

The participants were able to complete the confidential survey at their convenience and submit the data to the researcher electronically. The feedback of the surveys were collected from the period from 7th June 15 to 27th Jun'2015. The data have been recorded and updated simultaneously the responses were received.

vii. Reliability and Validity

Survey research is generally weak on validity and strong on reliability (Babbie, 2004). The weakness of validity lies solely on the artificiality of the questionnaire format. To assist with validity and reliability, the researcher pilot tested the questionnaire with employees of

pharma companies outside the study population. The pilot test is one of the most critical steps in questionnaire design and serves two functions. First it serves as the initial "live" test (Iraossi, 2006). Second, it is the last step in finalizing the survey questions and format (& 87). The pilot pre-test had three basic goals: to evaluate the competency of the questionnaire, estimate the length of time to take the survey and determine the quality of the surveyor. The pilot sample offered feedback to the researcher whether the questions were clear and easy to all the participants (Iraossi, 2006). This pre-test would detect flaws in the questioning and allow the researcher to correct those prior to the main survey. The pilot survey was administered to a small group of employees of pharma companies, not to dilute the study population.

viii. Data analysis

The analysis of the survey data was processed using Microsoft Excel and the add-in software. The descriptive statistics was used to compute frequency counts (n), percentages. Tabulation and charts were provided for the ease of comparison between different options. The chi-square was performed by using SPSS version 20 software.

Designing the survey, collecting the responses and analyzing the data was done by using graphical representations, statistical analysis and tools based cases.

ix. Data interpretation

In the current research, an exploratory study approach was followed as the idea was to explore the perceptions and attitudes of people working in pharmaceutical industries at various levels and designation on one hand and different age groups on the other. The primary data in this research are collected from Pharma professionals working in different fields through questionnaires and survey via online as the targeted group are technocrats using internet and smart phones. The secondary data on the other hand were collected from published articles and journals.

The current study utilizes the benefits of both qualitative (SWOT and PESTLE Analysis) and quantitative research techniques. The views of employees and promoters have been

covered in an attempt to provide most valid, accurate and comprehensive knowledge to the reader. P values from Chi-Square were used to understand the statistical significance for the questions with direct answers.

The data outcome of the study from the study questionnaire was aimed to understand the associations between perceptions and the level of influence. This data along with the narrative inquires and the literature review will help to build a clear picture on how digital strategy helps medium scale pharmaceutical companies in international business and its impact in India on a quantitative basis and help to develop conclusions and recommendations.

3.5 Research Methodology – Phase II

In the phase of the research, the objective was to understand the relative importance of various motivations behind pursuing digital interventions (strategy) by pharmaceutical companies, self-assessment about their capabilities in pursuing a long term digital strategy, and plausible outcomes that are desired by these firms. It is to be noted that the company objectives could differ across size of the firm. Hence an attempt was made to compare the varying nature of these importance across firm sizes. Considering the study objectives span both qualitative and quantitative domains, a mixed method design approach (Johnson et al, 2007) was adopted accordingly.

Specifically, three research prepositions are elaborated in this study:

1. To explore various motivations behind pharmaceutical firms using digital strategy
2. To find out whether these motivations vary across firm sizes
3. To find out contributors to long term success of digital strategy across firm sizes.

Data Collection and Questionnaire Design:

Data were collected from 50 midlevel and above executives working in Pharmaceutical companies. These informants were the same sample which was used in phase 1 of the study. Of those executives who answered phase 1 and who responded that their organization was either seriously contemplating to pursue digital strategy or already pursuing digital strategy. Sample characteristics are as follows:

- Small firm sample - 13
- Medium firm sample - 15
- Large firm sample – 22

Considering that the data is collected from same sample used in the last phase, repetition of details about comprehensive demographic characteristics becomes redundant.

STAGE 1: Qualitative Study

In this phase of the study, researcher intended to generate an exhaustive list of motivations behind pharmaceutical companies pursuing digital strategy. To address this objective, focus group method was utilized and recruited three focus groups to begin with. First focus group contained executives from small pharma companies, second from medium scale and third from large scale companies. All focus groups had five participants each. This scheme was followed in accordance to Frey and Fontana (1991) suggestion that focus group should contain respondents belonging to the same category to foster healthy discussion.

The criteria for participation were that the executives participating in the focus groups should be part of organizations implementing digital strategy at workplace. Discussion guide tailored for the focus group had open ended questions spanning from experience sharing about digital strategy to discussing about contribution of digital strategy in organizational development and growth. Since the members didn't want their voice to be recorded, the discussion points were summarized by an external transcriber through the discussions. Transcriber was well versed with the modalities of qualitative research and his services were also used for reliability analysis of the qualitative data in analysis stage. Transcripts were analyzed based on thematic analysis frame work (Braun and Clarke, 2006). The third focus group resulted in no additional information. At this stage considering the saturation of information obtained, no further focus groups were conducted.

Transcripts of all the focus groups were coded according to inductive thematic analysis. According to this technique, the author does not apriori assume any frame work for coding, and the themes obtained from data dependent only on the emerging structure bound by the data collected.

General thematic analysis framework followed in the paper is as follows. During the first stage, the transcripts are elaborated to include participant's original wordings. The transcription is read and further reread to make sense of data and comprehend the emerging themes. No coding of data happened during this stage. In the second stage, researcher

followed open coding mechanism. According to this method, the essence of sentences was summarized in concise phrases. These phrases were called open codes. Sentences that captured similar essence as that of earlier ones were given same open codes. In the third phase, open codes that contained similar information were collapsed under broader heading called themes. In the fourth phase, these themes were checked for internal consistency and possible redundancy. In this phase the first and second authors were utilized to get an out sider perspective as they have not participated in the initial coding process. Both researcher and the transcriber have cross checked each theme for its consistency with the open codes.

Also, together checked whether each theme contained distinct information that is not captured by other themes. This process resulted in retention of three themes. In the last stage, the themes had to be named. Finalized names of the themes are illustrated in the second column of table 3.3.

STAGE 2: Qualitative Analysis

Questionnaire design:

The questions broadly correspond to the themes generated in the focus group discussions. Considering the paucity of time that the executives have in filling questionnaires, all answers were sought on a simple "yes" / "no" scale. Accordingly, each theme was expanded as a single question that required the respondent to either agree or disagree summarily. Apart from 12 questions based on focus group based data, question on size of the firm was also sought. Design of questionnaire is illustrated in table 3.3.

Table 3.3 Questions based on thematic analysis – Phase II research

Sl. No	Theme name	Question	Response
	Digital Strategy Motivation		
1	Productivity Motivation	Digital strategy helps my organization to be highly efficient, productive, responsive & competitive	Y/N
2	Market Penetration Motivation	Digital strategy facilitates my organization to operate at global level & making product more popular at global market	Y/N
3	Brand Equity Motivation	Digital strategy facilitates my organization to become border-less company thus project a strong brand culture	Y/N
4	Customer Interaction	Digital Strategy facilitates my organization to obtain direct customer feed back	Y/N
5	Data Management	Digital Strategy facilitates my organization reduce the Time to Market and pursue data Management effectively	Y/N
6	Productivity	Digital Strategy facilitates my organization to increase in Sales and Productivity	Y/N
	Digital Intervention Impact		
7	Global Standards	Digital strategy facilitates my organization to achieve international standards in terms of Operations	Y/N
8	Agility	Digital strategy facilitates my organization to change the phase and pace of the business and the mode of operations according to business environmental needs	Y/N
9	Competitive Advantage	Digital strategy facilitates my organization to have a competitive edge advantage in Marketing and increasing bottom line	Y/N
	Organizational Outlook		
10	Digital Strategy @ Corporate Level	My organization pursues digital strategy as a corporate strategy	Y/N
11	Digital Intervention Capability of the Firm	My organization has adequate know how to conduct and manage digital interventions	Y/N
12	Success Belief	My organization believes that implementing digital strategy at workplace contributes to long run success of the firm	Y/N
13	**SIZE OF THE FIRM**	How do you qualify the size of your firm:	S / M / L

CHAPTER IV

DATA COLLECTION, ANALYSIS & INTERPRETATION

In this chapter analysis of the data and interpretation done for both primary and secondary research findings.

4.1 SWOT and PESTLE Analysis – Secondary Research Findings

Secondary research was done by reviewing numerous articles, books, news articles, business reports etc. available online. SWOT analysis and PESTLE analysis model were adopted to list out some of the findings in brief. These methods provide the basic information to understand internal and external factors for any company venturing in to new business, territory, products, etc.

Table 4.1: SWOT analysis of Pharma industry

Strengths	Weakness
Cost effective process for Bulk drug and formulations	Less investment in research and development
Strong manufacturing base with technical know-how	Lack of coordination industry and academia
Availability of high quality, qualified skilled workforce	Negligible expenditure on healthcare in the country compare to other markets
Excellent marketing and distribution network	Manufacture of low quality medicines by some companies to impact global image
Diverse ecosystem to diversify the business to mitigate the risks	Less support for start-ups in pharma compare to other sectors
Opportunities	**Threats**
Increased export potential due to the globalization and change in healthcare trends in emerging markets	Product patent regime is major threat to domestic industry unless the industry takes up R&D initiative aggressively
Collaboration with multinational companies to license out and co-marketing opportunities in global markets	Regional companies globally becoming aggressive because of the technical know-how availability
Double-digit growth in domestic market to drive the revenues and increase the product portfolio.	Increase in average labor cost, minimum support from government could put India in back foot compare to China
Contract Research and Manufacturing opportunities because of the science talent	Drug price control to affect profitability of the pharma companies in India
Due to demand, export of generic drugs to developed markets to	Change in business environment PESTLE to impact Indian industry in a big way

A general SWOT analysis of the Indian Pharmaceutical industry listed in Table 4.1 reveals some important aspects and gives a clear picture of its position in internal and external environment (Report of Task Force 2008).It is essential to identify main environmental forces currently affecting the pharmaceutical industry.

PESTLE Analysis

PESTLE analysis that comprises of Political, Economic, Social-cultural, Technological, Legislative, and Ecological aspects helps to identify forces in the macro-environment that currently affect a business and continue to do so in the future is illustrated in Figure 4.1. The most essential aspect of PESTLE analysis is to identify factors that significantly effect a given industry and organization. The factors that interact with each other would be more helpful for an industry as they have greater implications (Partridge L, 2005).

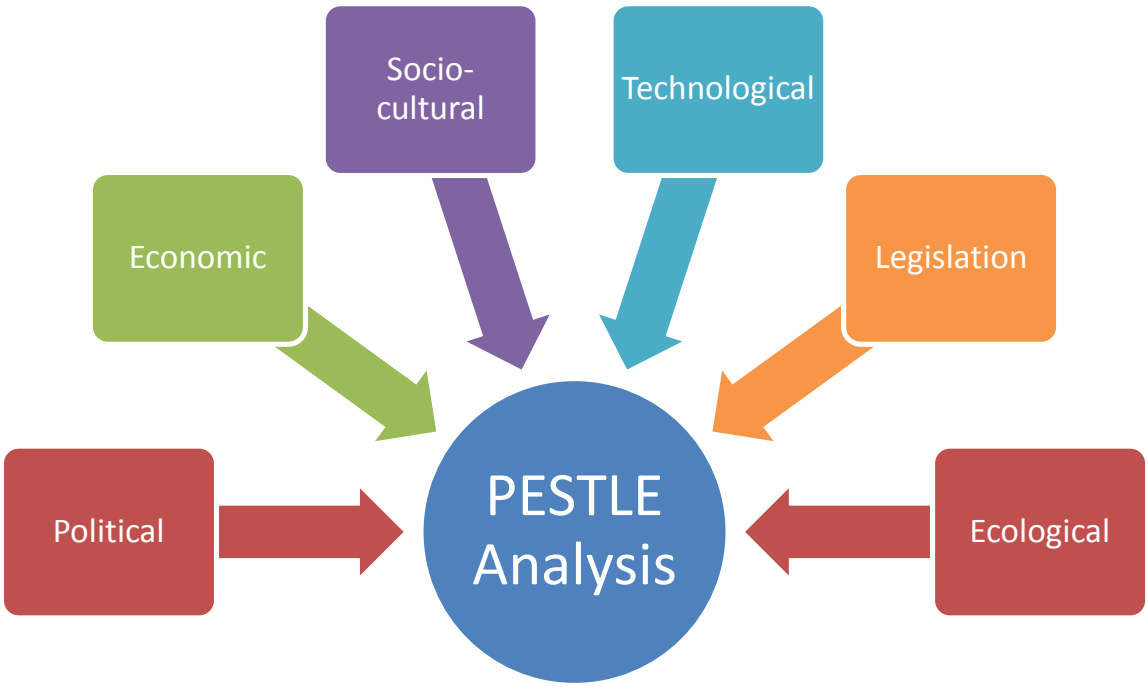

Figure 4.1: Typical components of a PESTLE Analysis

It is important to study PESTLE Analysis while launching a new product or service, entering a new region or country, considering a new route to market, working as a part of strategic project team. (Team FME, 2013)

Identification of main environmental forces currently affecting the pharmaceutical industry captured below.

i) Political - Both domestic and foreign policies of government have a great effect on the industry innovation as compare to the other factors. Globalization has a huge impact on the political decisions of any country. To attract the foreign companies, governments offer special incentives like tax exemption, tax holidays, easy repatriation, Visas for the foreign employees. This is one of the policy emerging out from the political decision and encourages the healthy competition. For example GSK increase their operations in Singapore due to low taxes and others government support. Same like, United States purchase more than 45% of drugs, the main reason is to allow foreign industry to compete with local, which may help to low prices and reduce health budget. (Floyd D, 2008)

From 1980 onwards, governments focused on pharmaceutical industry to handle the challenges of price control, monopoly and trade. For example, in the European countries like Spain, Portugal, France and Italy the pharmaceutical manufacturing was cost effective and thus these countries used to ship their products to UK, Germany and Sweden to get high profits due to very high prices in these markets. In the USA, the price of pharmaceutical products is high as compared to neighboring Canada due to its high investment on healthcare budget and high per capita spending for medicines in USA. Like in US Lipitor (a generic version of atorvastatin used to treat dyslipidemia) sold at USD 3.20 per pill in 2003 compare to USD1.89 per pill in Canada. (Holland S, 2004). These factors could reverse or change in a big way when there is a vacuum in politics.

ii) Economical - Global business is driven by the stable economy of the world. In the current scenario, pharma industry is less affected as compare to other manufacturing industries and until 2011, this sector was dealt for foreign direct investments. (World investment prospect survey, 2009). However, during 2002 slow economic growth has put the pressure on the EU market and restricted its growth to 8%. Other economy related factors affects the pharma industry are interest, taxes, inflation and exchange rates. Change in the foreign currency rates will have a huge impact on the exports and imports of drugs. High interest rates discourage investment the industry and will have solid impact on the organization and stakeholders. Impact on these economic factors is established in the

secondary research. Research and Development is a lengthy process, which will have an impact in terms of investment if there is an unstable economy. Mergers, acquisitions and diversification allows the industry to enter in new market or develop new drugs if there is a stable economy. In 1996 two big companies, Swiss giants Ciba and Sandoz, merged as one company and named as Novartis. (James H. Taggart, 1993).

iii) Social - The social life, eating habits, physical activities and level of health of a community affects the pharmaceutical industry. Change in social life and trends give a new direction for the local and national pharmaceutical industry. In the same way average life of an individual, deeply change the dimensions of the industry if a person who lives more than 60 years consumes more drugs than the young people and benefits pharma industry. Another important aspect of social life is fast foods and also as called Junk foods and drinks. They have contributed to the growth of the pharmaceutical industry in the recent decade. Social related dreadful diseases will also have a huge impact. As quoted in in the literature review of the current study, in the last decade, pharma industry was continuously in the limelight and become more popular after dreadful and contagious diseases like SARS, AIDS, Swine Flu hit the world badly. Global media and all governments worked hard to spread the awareness on these diseases and pharma industry benefited from these diseases (Michael A. Santoro, 2005).

iv) Technological – Pharma industry is technology driven sector and hence plays a vital role in the growth. After reviewing couple of articles in secondary research it is clearly establishes that, in the recent years due to change in the disease trends and global regulatory pathways the industry is struggling to develop new technologies to combat the dreadful and challenging diseases plaguing the world. Further, many researchers suggested that for a pharmaceutical industry to become successful and sustainable latest technologies in all domains play very crucial role. These technologies will have impact on social, economic, and environmental factors too. It was found from secondary sources that the adoption of automation and digital applications in R&D, Manufacturing, SCM and Marketing will help pharmaceutical industries to optimize the processes, increase the productivity, bringing down the costs and enhancing the competitiveness of the products or services. In R&D with fewer resources like time, money and efforts, the latest technologies will yield more

accurate drugs for a specific disease there by decrease in all hurdles from research to manufacturing efficiently, reliably, and rapidly. (Fernando J Muzzio, 2002).

v) Legal - Undoubtedly pharmaceutical industry is a highly protected by laws of the regulatory bodies and intellectual property rights. As per the findings from the secondary research, pharma industry faces hurdles from the development stage to the commercial stage because of requirement of many legal clearances. During testing of new or generic drugs on animals, approval from ethical bodies is mandatory. Post pre-clinical; to test a drug on humans, companies have to undergo with lots legal hurdles to get the ethics committee and FDA approvals from initiation to completion. To get the marketing authorization, FDA inspects the manufacturing facility and reviews the product dossier which is a lengthy process and to clear these stages companies have to spend somewhere between 5 – 15 years depends on the type of drug and testing methods. In spite of spending huge resources then the company has to clear the patent checks, pricing approvals before it reaches the patients. Due to the long gestation period involving legal, regulatory challenges, there is a delay in commercial launch of new products, which will have impact on healthcare of the patients. For example in United States the greater restrictions of regulation is evidence to delay in the local market of demanding new drugs. In 1989, 18 of the 23 new drugs introduced and approved for marketing in other countries while in US received their first marketing. (Stevens, Mark, 2009).

vi) Ecological- At times pharma industry faces daunting task to balance the development and manufacturing of the life-saving critical drugs by adopting environmental standards. Manufacturing of Key starting materials, intermediates and bulk drugs causes air and water pollution if the environmental standards are not maintained properly. This has put the industry under tremendous pressure and hence lot of polluting industries are shifted manufacturing base to the rest of the world countries like India and China. Pharma companies have to declare the emissions and have to follow the green standards of the environmental guidelines and it is very difficult and expensive process. This has led to the pollution of the environment in some parts, which will have a huge impact on human health. This could be one of the reasons for growth for the manufacturing of bulk drugs in India and China where environmental clearances are easy when compared to developed

countries. These factors are observed in the literature review and the findings clearly confirms this. In conclusion, to balance both environment and business pharma and healthcare companies must focus on three principal strategies to reduce the input of chemicals compounds, carbon, and wastewater in to the environment. Companies must adopt advance technical approach, proper education and training of the all the stakeholders of the sector (Klaus Kümmerer, 2009).

Conclusion:

In general, these forces are applicable to all the sectors of the global industry; pharma industry is always in the midst of the challenges because the industry directly deals with the health of the people and the world. For a company aiming to enter this business and to focus on the global markets, serious efforts are required to evaluate the PESTLE analysis for every country to understand the hidden challenges that could pose serious challenges post entry. As per the findings from various articles in the literature review chapter it is evident that many pharma companies have miserably failed due to various factors related to PESTLE. However, this analysis further reveals that Indian pharma companies have an edge in global markets compare to companies from other countries. Researcher would like to list out some of key factors like cost of manufacturing, availability of science based human capital, industry friendly policies, skillset in chemistry and biology, huge domestic market, many stable economy and leaders in pharma etc. However, pharma industry has long way to go to compare to the companies from developed countries. Industry need to reinforce its strengths and work out on weaknesses in the area of new drug discovery research and adoption of automation and digital technologies to compete and sustain in India and global markets.

4.2 Data Presentation, Analysis and Interpretation (Phase – I)

The analysis of the survey data was processed using Microsoft excel and the add-in software Analyze It. Descriptive statistics was used to compute frequency counts (n), percentages. Tabulation and charts are provided for the ease of comparison between different options. Using the numbers and percentage, data was compared amongst the parameters in each question and Interpretation of the parameters mentioned against each question. Research findings were then compared with the observations from the literature review and key questions are tested with the set hypothesis. The chi-square was performed by using SPSS version 20 software for the questions directly related to the hypothesis.

1. **Designation of the respondent in the company:** Data from the participants from various designations gives more authenticity.

Table 4.2: Designation of the respondent in the company

Designation	No of Respondents	Percentage
Manager	28	35%
General Manager	21	26%
Vice President	12	15%
Top Management	19	24%
Total	**80**	**100%**

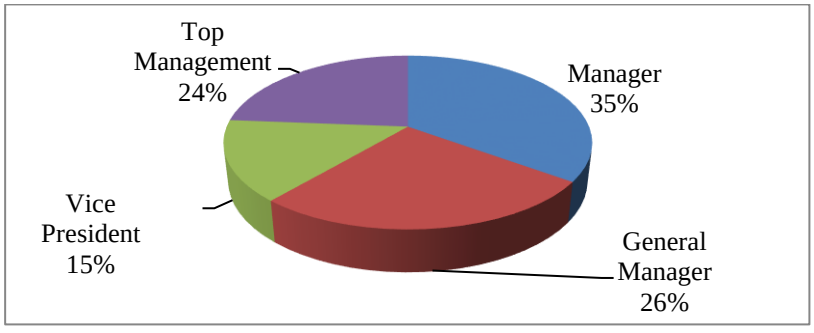

Figure 4.2: Designation of the respondent in the company

Out of 80 participants in this study, mixed group of various designations like 35% managers, 26% general managers, 15% vice presidents and 15% from top management is a good blend of various level an indication of heterogeneous sample size, which is good for this study. This mix indicates that it is an excellent combination of the positions to understand the need of new digital tools in various domains.

2. **Educational Background of the respondent:** This is key factor to understand the research topic very well and the outcome would benefit the study.

Table 4.3: Educational background of the respondent

Qualification	Respondents	Percentage
Degree (Graduation)	15	19%
Master's Degree & Above	65	81%
Total	**80**	**100%**

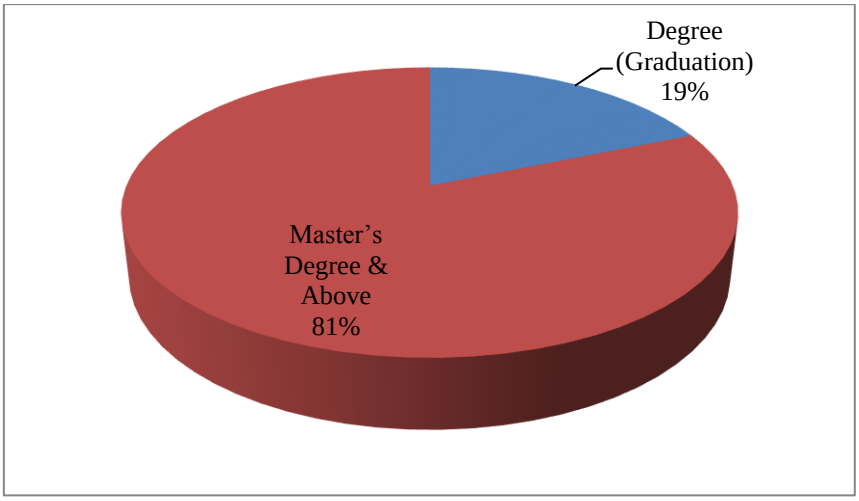

Figure 4.3: Educational qualification of the respondents

With regard to the educational qualification, 81% of the participants are post graduates and 19% are graduates. It is also worth to mention that some were having doctorates and additional certifications.

This data shows the validity of the general observation that the working force in pharmaceutical industry is highly qualified and capable not only just to share the correct picture but also implement strategies for a better international business.

3. **Age group of the respondents:** The topic selected for research is a unique one and the level of understanding depends on the age and experience.

Table 4.4: Age group of the respondents

Age group	Respondents	Percentage
30 – 40	34	43%
40 – 50	35	44%
50 – 60	11	14%
Total	**80**	**100%**

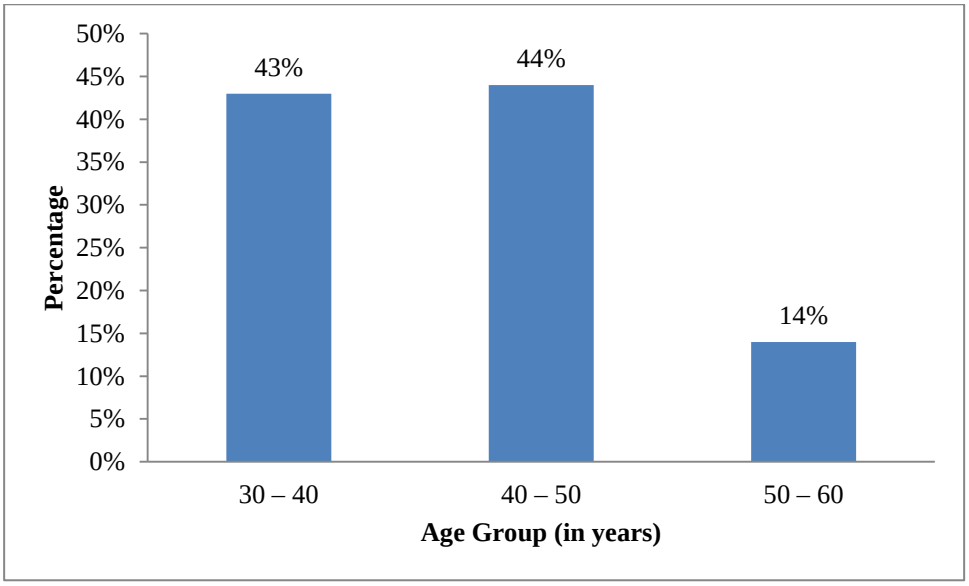

Figure 4.4: Age group of respondents

The present study reveals that the participants are from mix of age groups. This in turn confirms the researcher's plan of collecting data from a matured age group who hold an authority at their level and designation.

The average age group of respondents is 42 from which it is clear that the data recorded is mature data and as it from different levels and designations. Among 80 respondents, around 87% of respondents were fall age between 30 to 50 years and this is an indication of matured knowledge with a good experience and knowledge on the business, technology and challenges.

4. **Company type:** It is important to have a diverse mix of companies for the survey to get a different opinions.

Table 4.5: Participants from different type of companies

Company Type	Respondents	Percentage
Public listed company	30	38%
Privately held company	33	41%
Proprietorship company	8	10%
Partnership company	9	11%
Total	**80**	**100%**

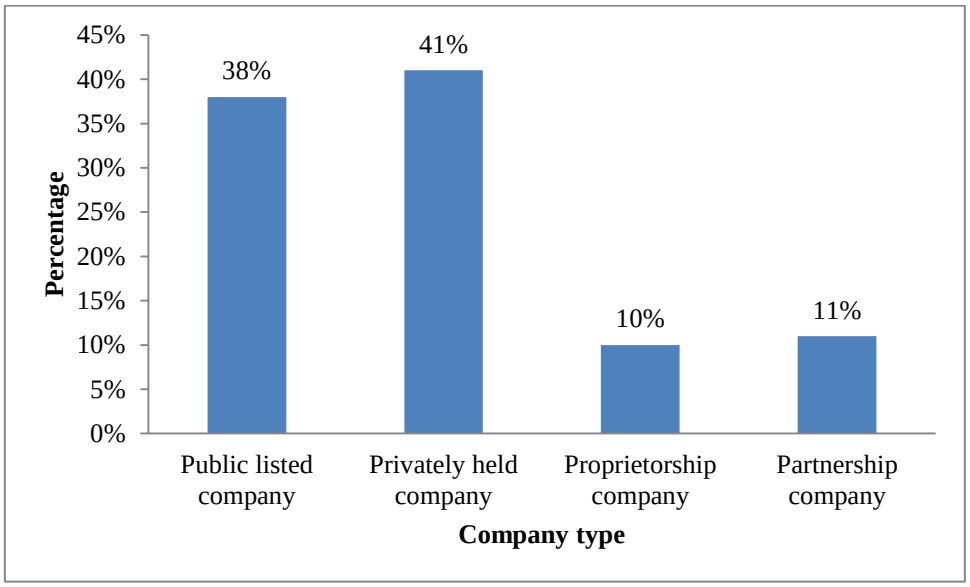

Figure 4.5: Participants from type different companies

The companies considered in the study are of four types i.e. public limited, private limited, proprietor and partnership because the perceptions of management and the culture matters when it comes to sharing the view on the selected topic. As per the data of questionnaire, majority of companies were privately held (41%) followed by public listed (38%), partnership (11%) and proprietorship (10%). This mix of company profile is advantageous to have diverse activities and culture that can help the study in a better way.

5. **Experience Level in Pharma Industry** – This question is important because the experience of the respondents is critical to understand the topic.

Table 4.6: Experience of respondents

Experience (Years)	Respondents	Percentage
05 - 10	10	13%
10 - 15	27	34%
15 - 20	23	29%
20 - 25	20	25%
Total	**80**	**100**

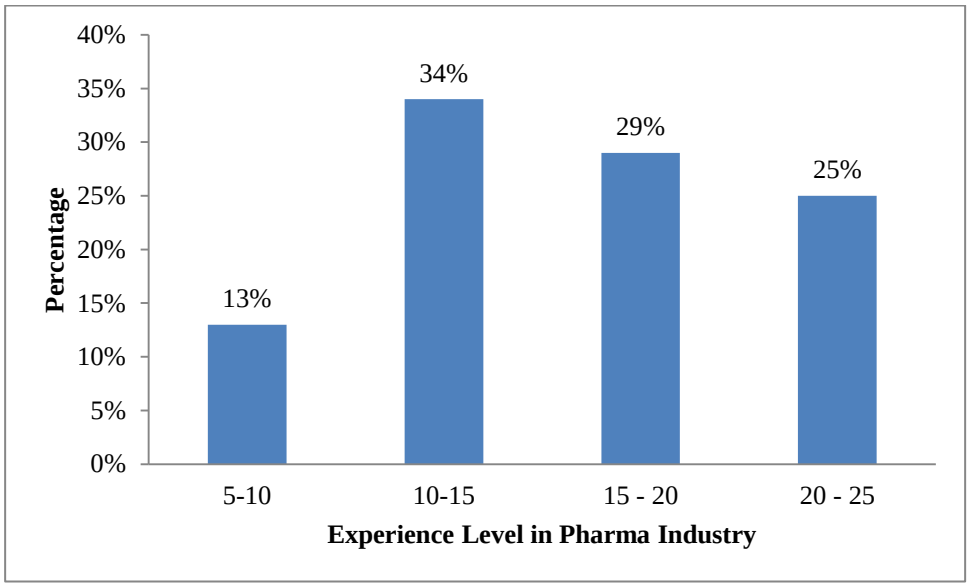

Figure 4.6: Experience of respondents

Experience is very critical to understand the research topic and fill the questionnaire with a genuine data. The average experience of respondents was 16 years. More than 60% respondents experience level was 10 to 20 years and almost 26% respondents experience level was 20 to 25 years. Hence, the data collected is logical and satisfying for the topic selected to get the data required. Thus, the author vouches for the validity of information collected and is optimistic that this information could for sure be beneficial for the medium sized companies and other organizations that plan to implement digital strategy for their national and global expansions.

6. **Company Involved in –** Heterogenous mix of companies with various activities are important to get authentic data for the study.

Table 4.7: Company's core business activity

Company Activity	Respondents	%
R&D	12	13%
Manufacturing	16	14%
Marketing	11	23%
Distribution	10	16%
All the above	31	33%

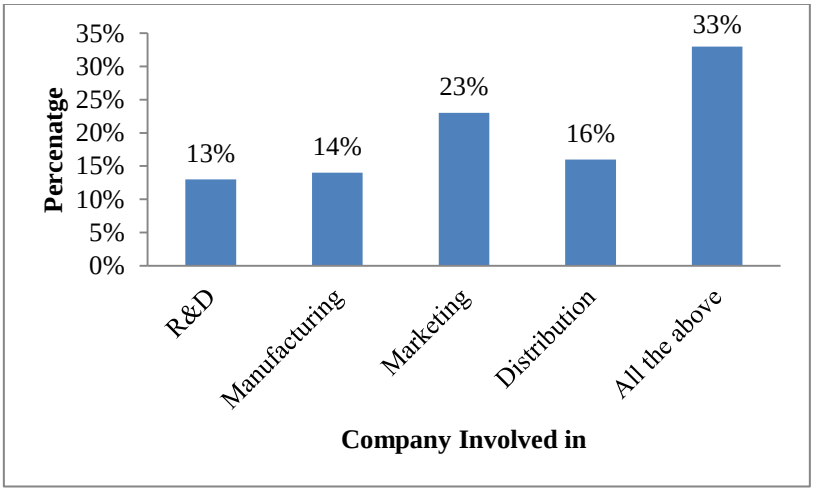

Figure 4.7: Company's core business activity

It is evident from the above observations that the digital strategies are being utilized in almost every single department of pharmaceutical industry and majority of respondents were with experience in the utilization and implementation of digital strategies in multiple functional area of pharmaceutical industry. Thus, the digital strategy has to play a major role in the globalization of almost all functional areas in pharmaceutical set up. Hence, respondents from all the operations were rightly selected for the current research.

The topic digital strategy role in globalization includes all core business activities of the companies and the value (33%) showed that companies involved in all core activities like R&D, Manufacturing, Marketing and Distribution.

7. **Company Size:** Various size of companies is required for this study to get a better views.

Table 4.8: Company size of the participant

Company	Respondents	%
Small (Below 100 crores/ annum)	21	26%
Medium (100 to 500 crores/ annum)	18	23%
Large (500 crores & above/ annum)	41	51%
Total	**80**	**100%**

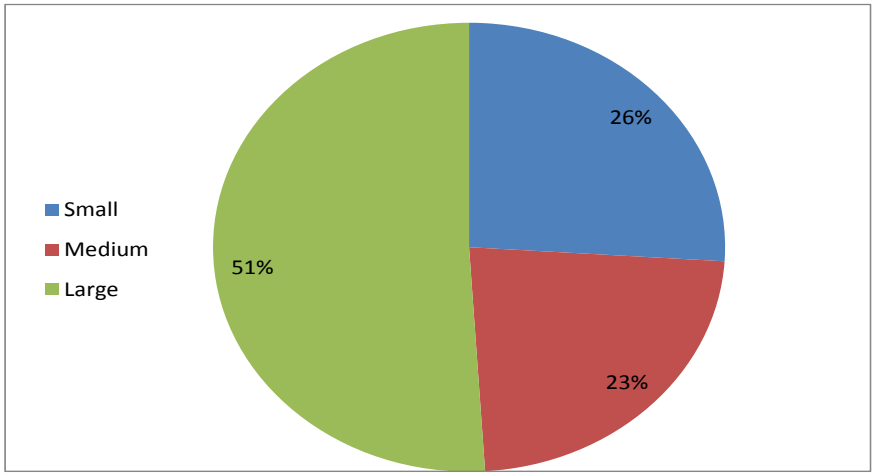

Figure 4.8: Company size of the participant

Majority of the respondents were from large pharmaceutical companies. It was obvious from the responses that many of these companies were not "large" when they started. However, within 5-20 years they scaled from small to medium to large. Though their success could be attributed to several reasons, the contribution of digital strategy and use of various digital platforms could not be ignored. The responses with respect to these strategies could play a pivotal role and for sure to form the backbone of the current study. A smaller proportion of respondents 26% and 23% respectively belonged to small and medium sized companies and their responses too are important to understand their views.

8. **Functional domain:** Respondents from all major functional domains of pharma industry were participated.

Table 4.9: Respondents functional domain

Function	Respondents	%
R&D	9	11%
Manufacturing	3	4%
Sales, Marketing & BD	55	69%
Techno commercial	9	11%
Supply Chain Management	4	5%
Total	**80**	**100%**

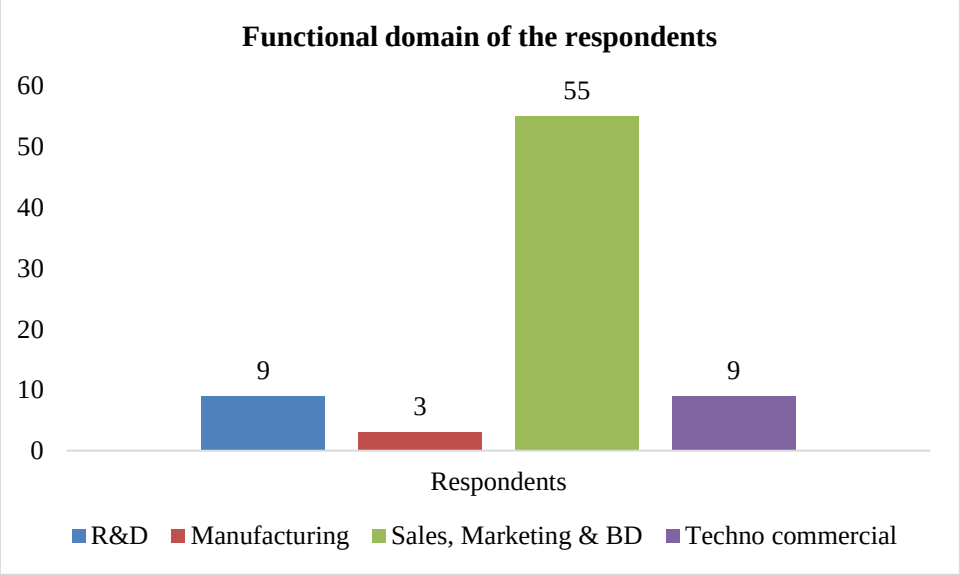

Figure 4.9: Respondents functional domain

Out of all functional areas, 69% respondents are from sales and marketing function and it is a good number for this study. Sales and marketing team will have an adequate knowledge on marketing strategies, market analysis, business analytics, digital strategies and others. There was also a mix of respondents from other functions like 11% from techno commercial and R & D, and 5% from Supply chain management participated in the study. This is the key criteria as the need of digital tools is equally important in most of these departments.

9. **Presence in global markets:** To understand the market dynamics it is ideal to have companies operating both in domestic and international markets.

Table 4.10: Global presence of Respondents Company

Option	Respondents	%
Yes	68	85%
No	12	15%
Total	100	100%

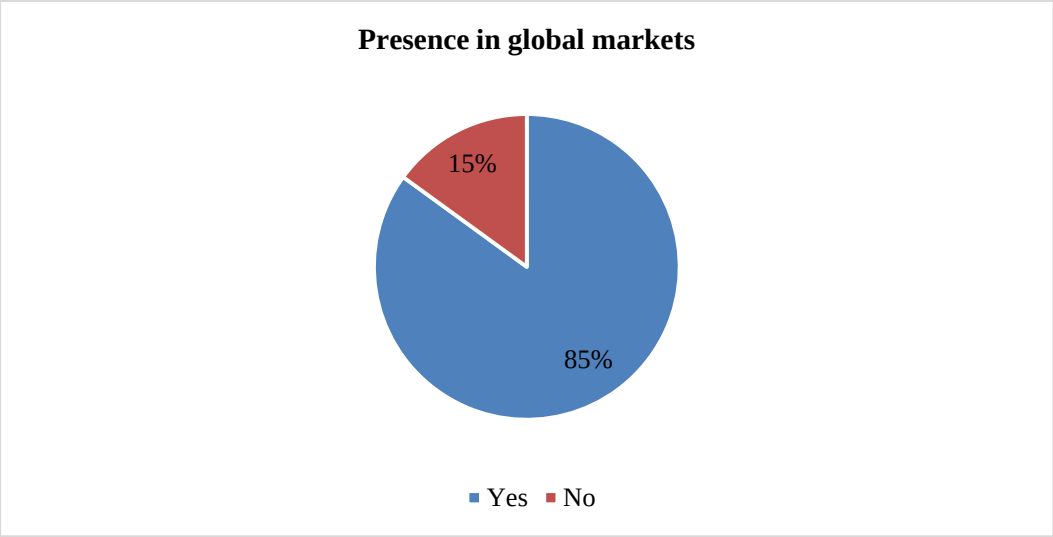

Figure 4.10: Global presence of Respondents Company

Majority of respondents, 85% were from organizations operating in international markets. This was for sure helpful for the research as the respondents were best to identify the potential challenges in international markets.

Similarly, the 15% respondents who represented domestic operations were helpful to provide an insight on philosophies of organizations and their understanding about international business and branding. The responses also suggested that both organizations at small and large set up had leadership teams comprising of senior people who were quite comfortable with existing set up and were reluctant to shift to or adopt current marketing tools.

10. Employee Base: No of employees in the respondent's company is an indicator of the efficient systems and processes to run the organization efficiently.

Table 4.11: Employee base of the respondent's company

Size	Respondents	%
<100	20	25%
100 - 500	9	11%
500 - 1000	8	10%
1000 - 10000	21	26%
>10000	22	28%
Total	**100**	**100%**

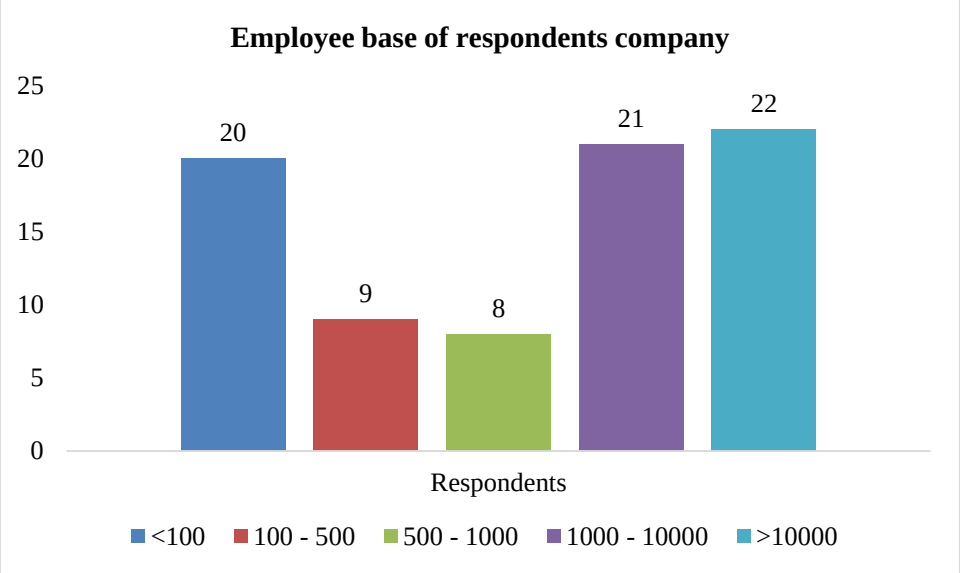

Figure 4.11: Employee base of the respondent's company

The main objective for considering employee strength for this study was to increase authenticity of the responses. Considering the fact that higher employee strengths reflect higher number of department and large scale technological deployments. The employee strength also shows the strength of the organization. Around 28% employee base of company were 1000 and above, and almost 26% less than 100. This is an indication of Heterogeneous source of information and the responses were not biased with size of the company

11. Benefits of Globalization to Indian pharmaceutical companies:

Table 4.12: Benefits of Globalization to Indian pharmaceutical companies

Options	No. of Respondents	%
Helps in building a global brand which adds value to the organization in long run	18	22.5%
Enjoy export benefits offered by Indian government	9	11.3%
It helps organizations to adopt glocal structure	10	12.5%
Contributes to Indian economy & sector growth helps in generating employment	15	18.8%
Leveraging technically skilled low cost manpower to compete with global companies	11	13.8%
All of the above	56	70.0%

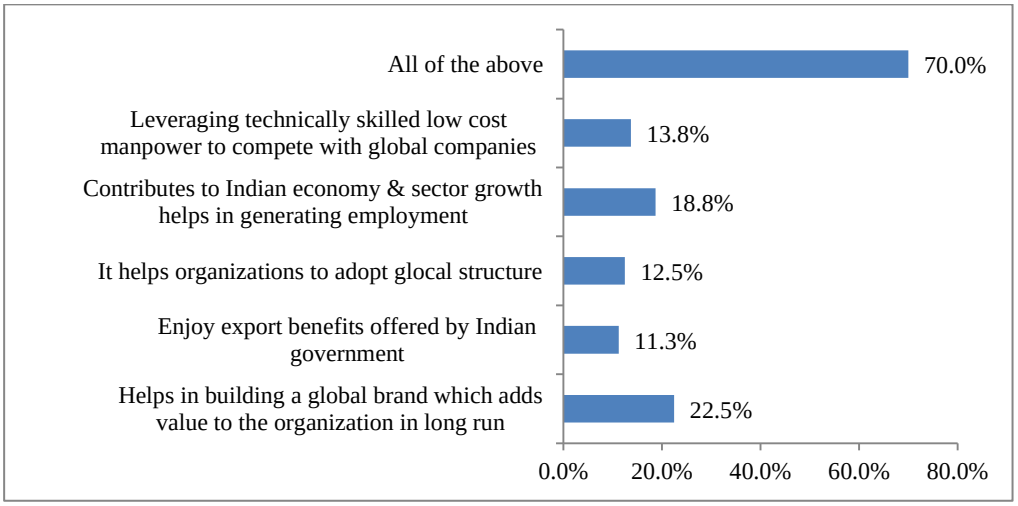

Figure 4.12: Benefits of Globalization to Indian pharmaceutical companies

In this question, all of the above option was given along with other 5 options. 70% of the respondents accepted that the globalization helps in building global reputation and the advantages helps in building a global brand, which adds value to the organization in long run. Enjoy export benefits offered by government. It helps organizations to adopt Glocal structure and contribute to Indian economy. This growth helps in generating employment by leveraging technically skilled low cost work force to compete with global companies. It is the key indicator that the Globalization has many benefits in long term.

12. Reasons for the growth of global pharmaceutical industry - Pharmaceutical industry is attributed to many factors and some of the important factors are used in this question.

Table 4.13: Reasons for the growth of global pharmaceutical industry

Options	No. of Respondents	%
Increase in prevalence of chronic diseases because of change in lifestyle	19	23.8%
Increase in global spending on medicines & health care	15	18.8%
Expanding access through health coverage and cost containment	9	11.3%
Increase in average life expectancy through advanced diagnosis and lifelong medication	13	16.3%
All of the above	51	63.8%

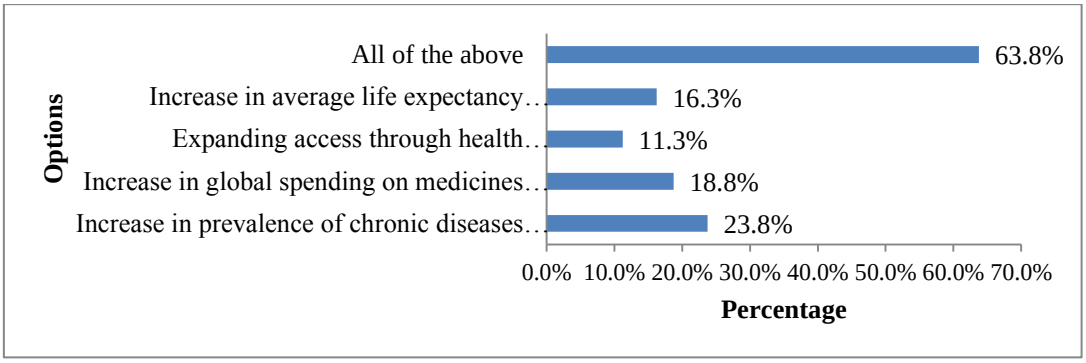

Figure 4.13: Reasons for the growth of global pharmaceutical industry

This question primarily focuses on the perception and the view of pharmaceutical growth in future. The future growth prospect to force the companies to adopt digitalization to have an international presence and the brand image by increasing the market share, productivity and profitability. There are many aspects, which need to be considered before stating the view. Some of them state that average life expectancy has been increased. Increase in global spending on medicines, expanding healthcare coverage and increase in prevalence of chronic diseases some of the factors. As the increase in literacy in under developed countries, the above factors will benefit and hence 63.8% of respondents suggest all the above options.

13. Opportunities for Medium sized Indian pharma companies in Global markets.

Global pharma industry is expanding and many opportunities exist for medium sized Indian pharma companies.

Table 4.14: Opportunities for medium sized pharma companies in global markets

Options	No. of Respondents	%
Leveraging on India's low cost manufacturing to compete in the global markets	33	41.3%
Strategic partnerships with regional companies for R&D of generics	17	21.3%
Semi-regulated markets to give quick entry to leverage the existing portfolio	33	41.3%
Collaborate and capitalize on new science	16	20.0%
All of the above	47	58.8%

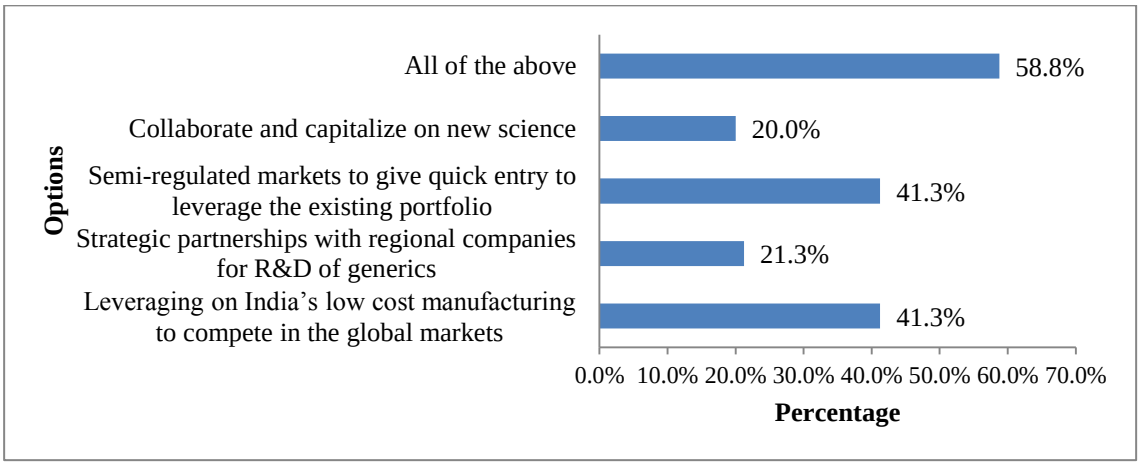

Figure 4.14: Opportunities for medium sized pharma companies in global markets

Since the research question and objectives revolve around medium sized Indian pharma companies the views of the respondents regarding the opportunities in global markets is necessary. Many factors will benefit this segment like collaboration, entry in to semi-regulated countries, strategic partnerships with global companies and more importantly 41% of the respondents felt one of the key factor is leveraging India's low cost manufacturing base. However, 58.8% of respondents felt all the factors to help medium sized pharma companies to become successful in global markets. These findings are important to structure the digital strategy plan for medium-sized companies.

14. Importance of digital strategy for Pharma companies to go global

Table 4.15: Importance of digital strategy for Pharma companies to go global

Options	No. of Respondents	%
To compete with the global and regional companies	8	10.0%
Helps the Organization to be highly efficient, productive, responsive & competitive	32	40.0%
It helps organization to become Intuitive enterprise	4	5.0%
Through border-less marketing companies can project strong brand culture clearly across the touch points & channels	13	16.3%
Flexibility to operate at global and local level & Making product more popular at global markets	18	22.5%
All of the above	37	46.3%

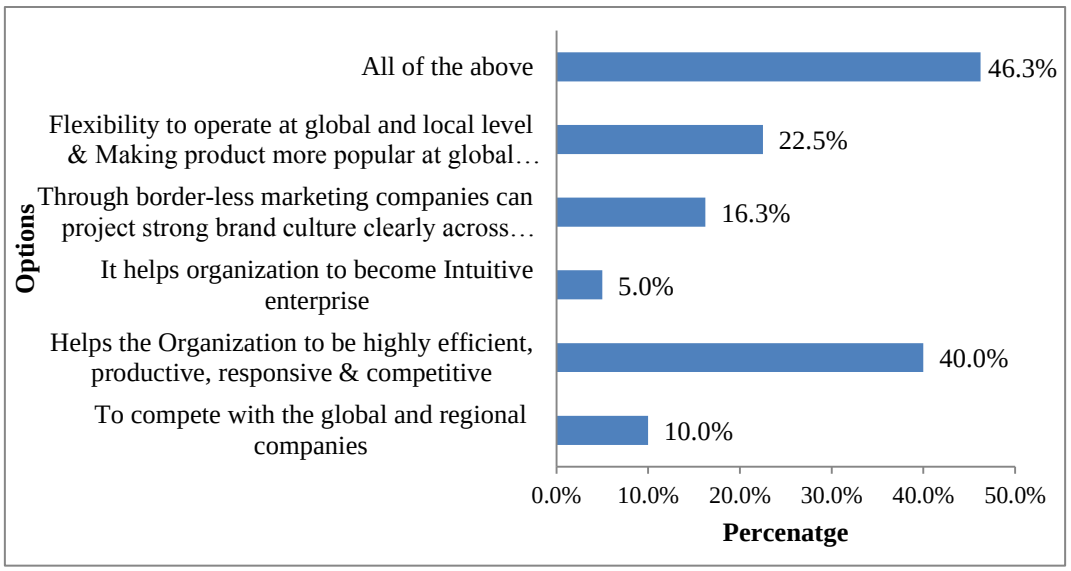

Figure 4.15: How does digital strategy help companies to go global?

This is the core question and it has been placed in the questionnaire to know how familiar the respondents with the latest technologies in marketing. Views and experiences of the respondents helped to understand the phenomenal of thinking and the area of expertise. The respondents shared their views that if the organizations adopt the digital strategy it helps organizations to have flexibility in operations at domestic and international levels. The digitalization helps organization to do border less marketing with strong brand image that in turn helps them to increase their revenue and the bottom line. Findings from this question emphasizes that the digital strategy has many benefits in global markets.

15. Benefits of cloud technology for pharmaceutical companies to become a serious player in global markets

Table 4.16: Benefits of cloud technology

Options	No. of Respondents	%
Time to Market and effective Data Management	20	25.0%
Cost Containment; Faster and better informed decisions	20	25.0%
Reduces Operating cost; Increase in Sales, Productivity, R & D and Profitability	18	22.5%
Direct customer interaction for feedback which will help in enhancing or upgrading the product.	14	17.5%
All of the above	45	56.3%

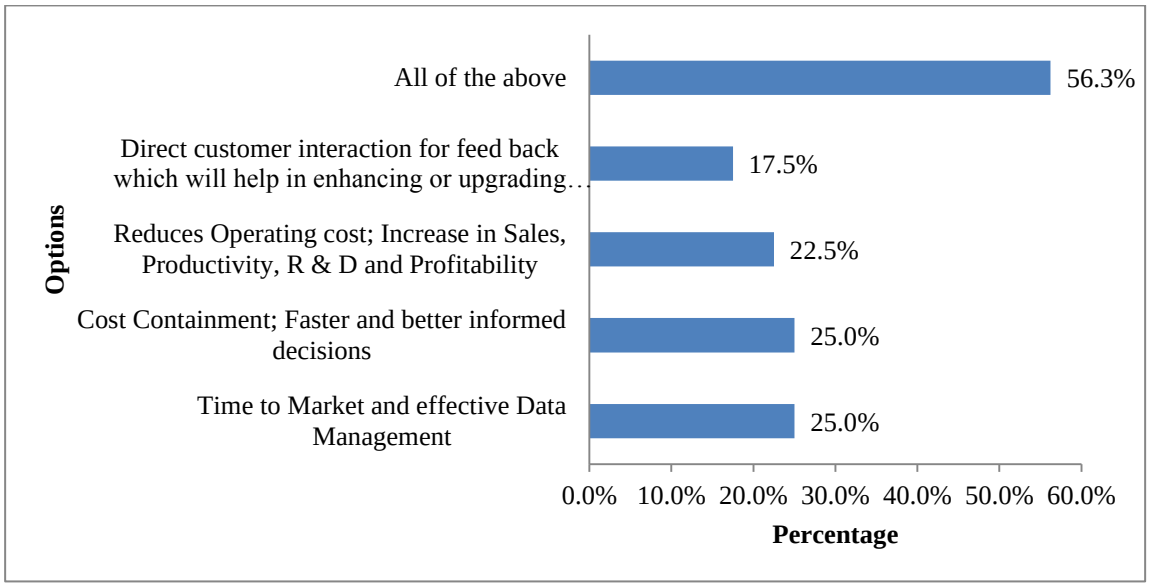

Figure 4.16: Benefits of cloud technology

With the mushrooming of numerous companies and high competition, the utilization of cloud technology helps for seamless integration of all emails and support systems. Time to market a product, plan and effective data management play a key role. The technologies could contain cost and enable faster and better-informed decisions. Some of the respondents also felt that using cloud platforms the interaction with the customer would enhance and becomes a good tool to promote the product. Around 58% respondents find all of the options are appropriate considering the enormous benefits of going cloud platforms. This tool is not expensive and hence medium-sized companies can consider going cloud to leverage the benefits that it offers.

16. Role of Chief Information officer in driving the company's digital strategy

Table 4.17: Role of Chief Information officer in driving the digitalization

Options	No. of Respondents	%
Driving digital transformation from top	12	15.0%
Putting Digital strategy in pace with ambition	13	16.3%
Placing Digital and Technology at the core of the business	15	18.8%
Forming partnerships with other technologies and counterparts	12	15.0%
All of the above	44	55.0%

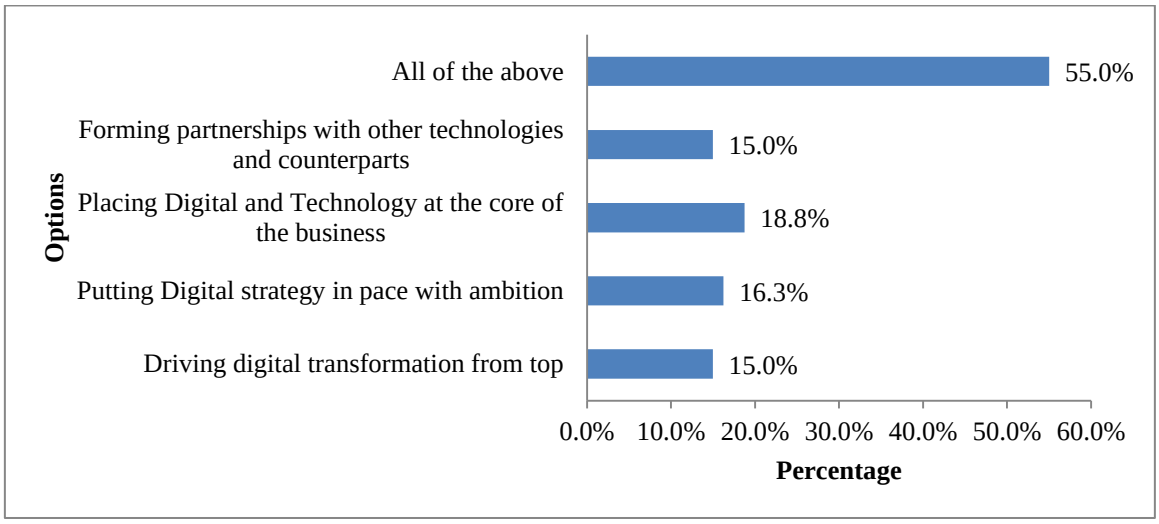

Figure 4.17: Role of Chief Information officer in driving the digitalization

Going digital being a strategic decision, it requires a senior management person like CIO (Chief Information Officer) to sensitize the need of digitalization to the board and senior management. Respondents had varied options like forming partnerships across cross functions, placing the new technologies at the core of the business, combining digital technologies with the company's ambition and adopting top to bottom approach. Around 60% respondents agreed that all of the above options were key aspects of CIO (Chief Information Officer) evolve for companies with strong focus on using digital strategies.

CIO plays a crucial role in digitalization process in terms of designing, execution and monitoring the digitalization across all functional domains. Research findings suggest that CIO has a role in bringing the transformation by managing the organizational change and organizations should consider having CIO or something similar role.

17. Need of market research software tools

Table 4.18: Need of market research tools

Options	No. of Respondents	%
Helps in creating a potential product portfolio by analyzing the market trends	23	28.8%
We can get accurate qualitative and quantitative data to determine the target market	18	22.5%
It helps in aligning research effort and capabilities with market growth potential	17	21.3%
It helps to keep focus on customers, Business and revenue growth	14	17.5%
All of the above	50	62.5%

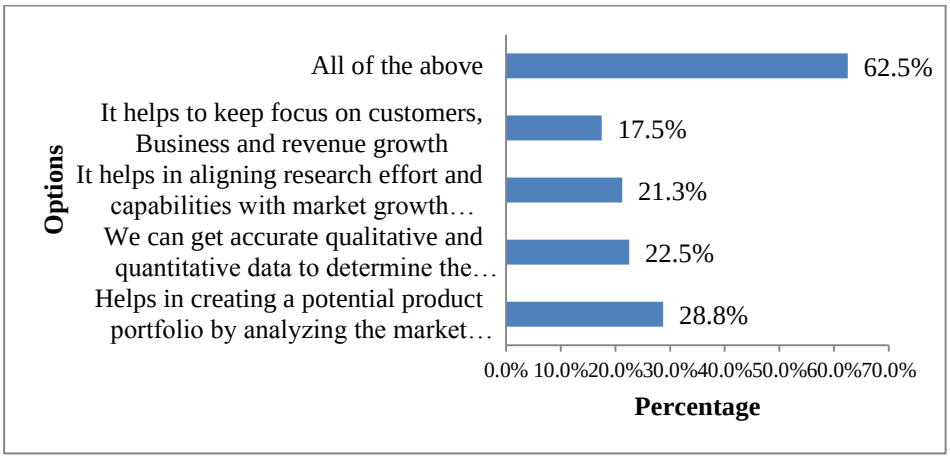

Figure 4.18: Need of market research tools

Around 63% respondents accept that the latest market research software tools are required for portfolio analysis, market research, business analytics and proper pricing and marketing strategy. It was also evident that the tailor made reports from dashboards for markets sales, pricing, products, compliances, filings and study of external and internal environments etc. could be generated from software tools, which will help management in decision-making.

It is also evident from the secondary research that the success of some of the major companies has been attributed to the adoption and deployment of right tools and software's that contribute to their tremendous success and unmatchable authenticity.

18. Digital marketing is essential for pharmaceutical companies

Table 4.19: Digital marketing is essential for pharmaceutical companies

Options	No. of Respondents	%
Yes	56	70.0%
No	9	11.25%
Can't Say	15	18.75%
Total	**80**	**100%**

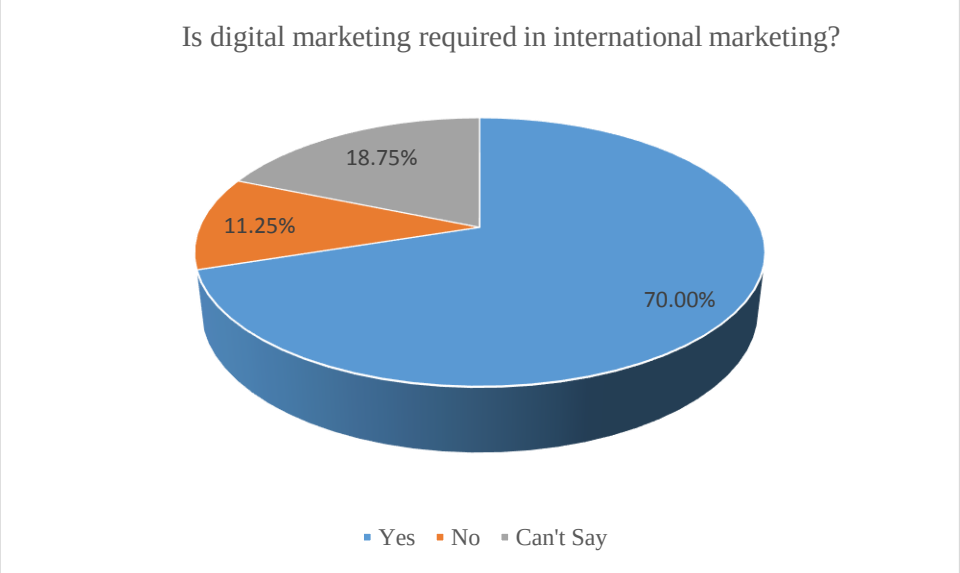

Figure 4.19: Is digital marketing required in international marketing?

Almost all respondents agreed that digital marketing is essential for pharmaceutical companies. A very high percentage of respondents (70%) strongly felt the need of digitalization of pharmaceutical companies. A mere 11% of respondents believed that digital marketing was not needed. This proportion of respondents generally belonged to a section of traditional marketing professionals who do not want to update themselves with the latest trends and technologies. 18% of respondents showed mixed response probably because the questionnaires were shared with almost all departments and they might be from different team with less or no experience in marketing. It is evident from the evaluation of global and Indian companies in the literature review and the study reports suggest that the digital marketing is necessary for pharma companies. Irrespective of the size of the company the digital marketing tools brings in many benefits from enhancing the brand to the market share etc.

19. Means of reaching customers and target customers with digital strategies

Table 4.20: Means of reaching right customers with digital strategies

Options	No. of Respondents	%
Getting statistical and analytical data of past responses, clicks and feed backs	32	40.0%
Taking the help of SEO techniques (Search Engine Optimization), Google ad words etc	13	16.3%
By checking the data using ad safe, double verify tools etc	14	17.5%
Diagnosing by using software's like Coms core's campaign etc software's	5	6.3%
All of the above	40	50.0%

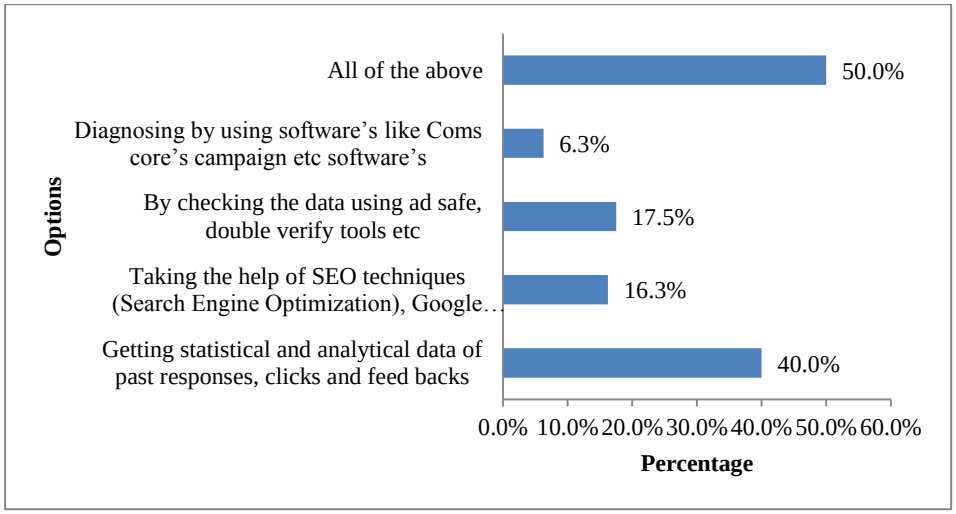

Figure 4.20: Means of reaching right customers with digital strategies

Around 40% respondents agreed that by getting statistical and analytical data of past responses, clicks, feedbacks, and more than 50% respondents accepted that by all of above options ensured that companies are reaching their target audience through their digital strategies. Furthermore, every aspect of digital marketing and modern day marketing tools and customized software solutions are trackable and measurable. Techniques such as search engine optimization, social media platforms, and video advertisements have been widely used and it has been observed in the case studies in the literature review chapter. Unlike the traditional modes of marketing, each step of digital marketing can be optimized and tweaked to provide the desired results.

20. Social media's role to build the brand in global markets

Table 4.21: Social media's role to build the brand in global markets

Options	No. of Respondents	%
Find Content which will resonate deeply with the targeted audience	15	18.8%
Know where your customers spend their time	11	13.8%
Positioning the brand, post quality videos, Promotions etc.	27	33.8%
Identifying and participating in right groups in Face Book, Twitter, LinkedIn etc.,	23	28.8%
All of the above	40	50.0%

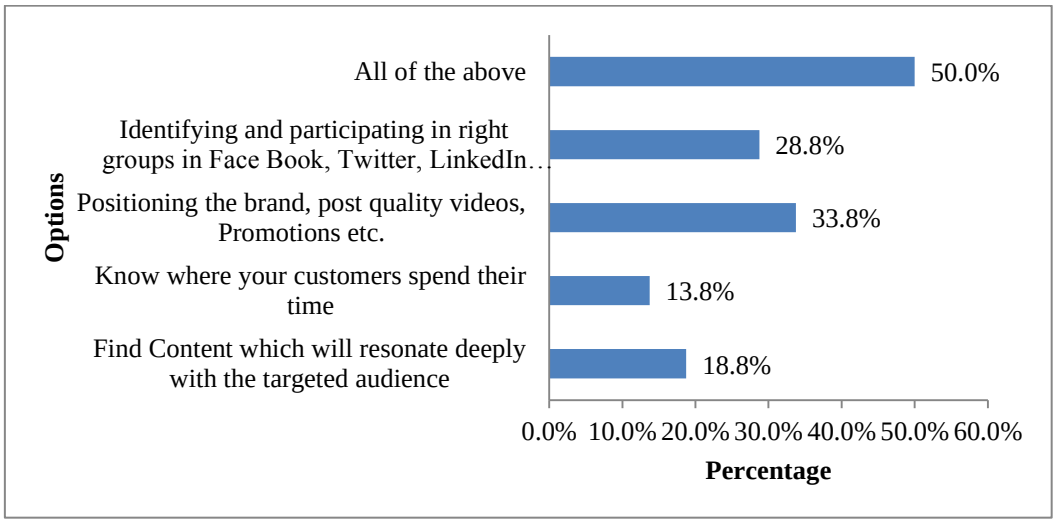

Figure 4.21: Social media's role to build the brand in global markets

Respondents agreed that identifying and participating in right groups on Facebook, Twitter and LinkedIn to position the brand with quality videos and promotions. Also, provide content that the target audience is searching would allow pharmaceutical companies to utilize social media effectively for a good brand building. 50% respondents agreed for all the options. It is noteworthy that the strategy for each of the social media platform differs and no one size fits all. It is essential to identify the social media platforms where the target consumer spends more time so that a strategy is devised accordingly. As per the majority respondents, social networking is the area where small and medium sized companies should invest as the costs are minimal and benefits are maximal. It was also found in the literature survey that many large companies have good presence in social media and it has benefited them to sell products and connect to customers easily.

21. Role of Automation in regulatory compliance with regulatory agencies:

4.22: Role of Automation in regulatory compliance with regulatory agencies

Options	Respondents	%
Complying with the guidelines of various global regulatory bodies.	25	31.3%
Time saving for CIOs compliance officers and cot saving for organization	12	15.0%
Helps in growth of the business on the compliance are strictly maintained and followed	9	11.3%
Helps in decision making with accurate data	18	22.5%
Helps in controlling the compliance at levels	14	17.5%
All of the above	46	57.5%

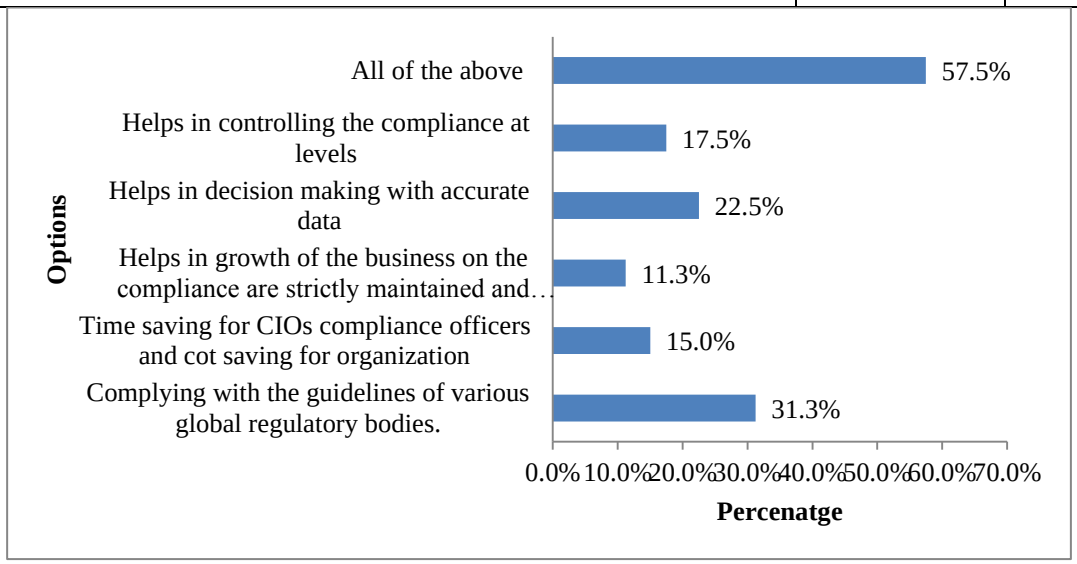

Table 4.22: Role of Automation in regulatory compliance with regulatory agencies

Around 60% respondents agreed that all of the above ways automation is going to help in increasing regulatory compliance of various regulatory bodies. The automation process helps CIOs and the compliance officers in time saving and cost controls and penalties and legal issues in case of noncompliance issues. Every country has become more serious about the quality of the products and quality of the trials done for the product. Right product dossier helps the company for early commercialization to get the maximum market share. Noncompliance to the quality norms have costed billions of dollars to global pharma companies in revenues and also the net worth of the individuals and corporates have been eroded with FDA's actions. Hence, medium sized companies should embrace the automation in early phase as a part of Quality by design concept.

22. Meeting market demand with the help of automated equipment and IT systems in manufacturing of Pharma products

Table 4.23: Role of automated equipment and IT systems in pharma manufacturing

Options	No. of Respondents	%
Minimize human intervention thereby minimizing the errors and maximizing the quality	23	28.8%
Increases the production output to meet the market demand	12	15.0%
Real time data management to comply with the regulatory requirements	14	17.5%
Online regulatory filings saves lot of resources there by faster approvals and early entry to market	13	16.3%
All of the above	53	66.3%

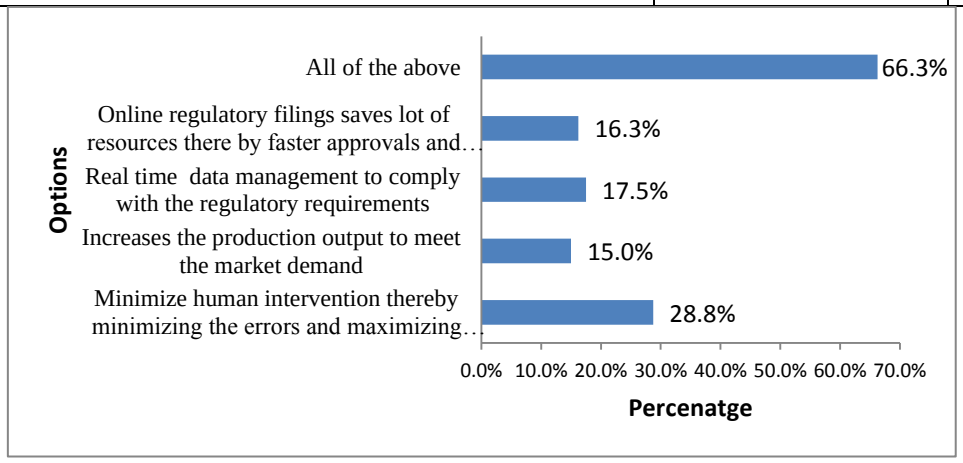

Figure 4.23: Role of automated equipment and IT systems in pharma manufacturing

An automated equipment coupled with right information technology in manufacturing of pharmaceutical products helps to meet the market demand. The entire process could be achieved by minimizing human interventions thereby minimizing errors, maximizing quality and ensuring a consistently better product. The automation could ensure that all regulatory requirements are met real-time. Online systems have brought the entire world together. Online regulatory filings save lot of resources, faster error free approvals and early entry into markets. Around 66% of respondents felt that the automation and online systems equipped pharmaceutical companies well. Secondary research findings establishes the need of the IT and automation where most of the leading companies have embraced the technology in the early phase and the medium sized companies need to think in this direction.

23. Significance of new software tools helps in designing marketing strategies to service healthcare providers and expanding to new territories to increase the revenues

Table 4.24: Significance of new software tools to design marketing strategies to healthcare providers

Options	No. of Respondents	%
The traditional paths to reaching healthcare providers, payors, and patients are changing, as they rely on new avenues to make their prescription decisions trusting new influencers and turning to emerging digital sources to fuel their choices.	11	13.8%
To add efficiency to their sales force and help keep up with changing demands, pharmaceutical companies have turned to technology, including Customer Relationship Management, Closed Loop Marketing and Sales force Automation	21	26.3%
Tighter physician schedules mean it's more difficult for pharmaceutical reps to achieve face-to-face time with doctors. New channels need to be examined for pharmaceutical companies to get their message across	8	10.0%
Marketing automation can help meet these new needs, helping marketers keep up with the new multi-channel and multi-influencer environment all while increasing their digital effectiveness	6	7.5%
All of the above	49	61.3%

More than 60% respondents agreed that all of the above ways new software tools helps in designing marketing strategies to service healthcare providers and expanding to new territories to increase the revenues. The global village is the latest concept and is prevailed across the globe. It opens the doors for the many entities to go global for expansions, and the trend is Glocal; Think Global and Act Local!. Hence technology is only one thing which is universal which is same across the globe and it the machine behind the growth of all business sectors success.

The traditional paths followed by pharmaceutical companies have changed over the past few years with the introduction of smartphones and internet accessibility has ensured to provide better customer relationship management, closed loop, and sales force automation. The current day's physicians are too busy and occupied to spare themselves for face-to-face meetings with sales and marketing staff and companies must embrace technologies that could provide them as newer channels to put their message across to the physicians.

24. Significance of using latest technologies in the manufacturing of pharmaceutical products in current business perspective

Table 4.25: Significance of latest technologies in current business perspective

Options	No. of Respondents	%
To meet the compliance and regulations without any deviations	19	23.8%
It reduces time to market and increases first to launch opportunities to gain the maximum market share	13	16.3%
Proper controls, well defined processes assures the high quality products	19	23.8%
Implementation, monitoring and feedback mechanisms can be achieved	11	13.8%
All of the above	46	57.5%

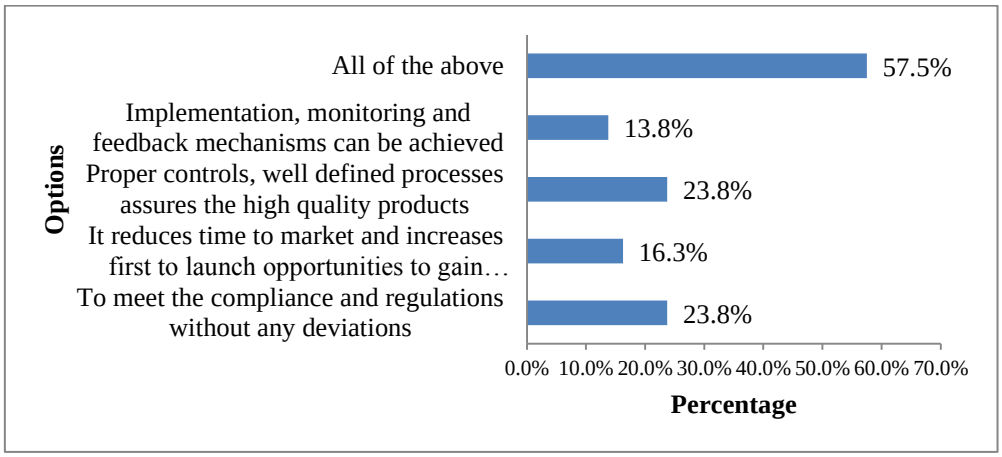

Figure 4.25: Significance of latest technologies in current business perspective

Along with the growth of population, literacy rate is also increasing and this has resulted in demand for goods. Japan has become leader and competing with America and it was successful by working on waste reduction with concepts like JIT, TQM, 6 Sigma etc. The latest software, tools etc. played key role in development of organizations directly and helping the nation's economic growth indirectly which is fact and statistical data is the evidence to support the statement. Around 59% respondents accepted that all of the above significance of using latest technology in the manufacturing of pharma products in current business perspective. Observations from the secondary research reinforce the findings of this study.

25. Benefits of latest tools like SAP/ ERP in Supply Chain Management

Table 4.26: Benefits of SAP & ERP in Supply chain management

Options	No. of Respondents	%
Real time Purchase order processing and on time deliveries	13	16.3%
Proper management of Inventory and sourcing	15	18.8%
To meet the good warehouse practices as per the regulatory requirements	15	18.8%
Real time status on the movement of the consignments globally	9	11.3%
All of the above	60	75.0%

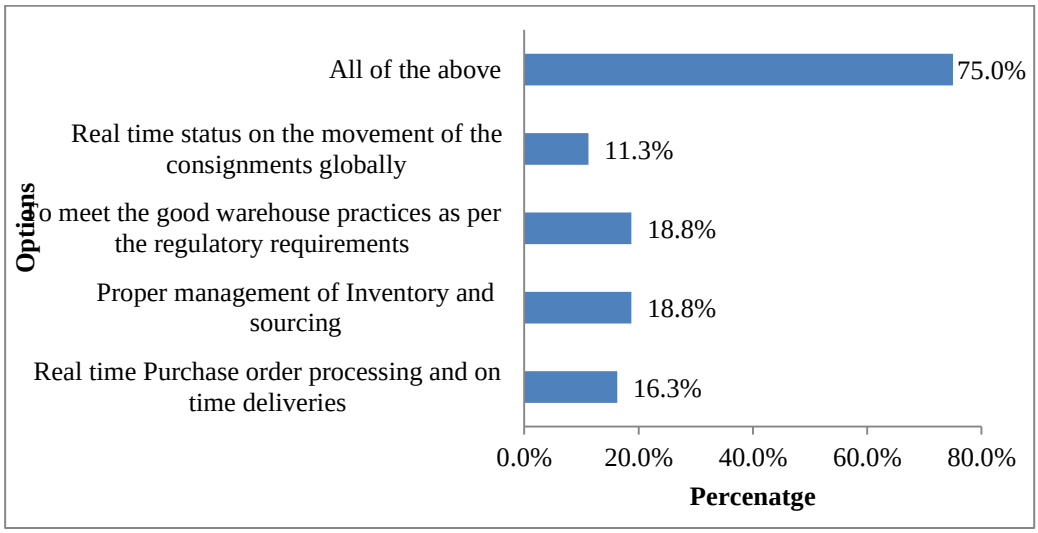

Figure 4.26: Benefits of SAP & ERI in Supply chain management

Around 75% respondents agreed positively stating that ERP (Enterprise Resource Planning) software tools play very important role in Supply Chain Management. Adoption of ERP and SAP will help an organization to get real time data, proper inventory management, processing deliveries on time and to comply with good manufacturing practices across SCM cycle. Since the medium companies focus to the global markets, it is very important to go for the upgradation to compete with large companies. In a detailed review of the literature many parameters were studied with some case studies and interestingly the findings of both the studies reveals the same facts.

26. Role of automation and new technological tools that helps to identify, conceptualize, and develop the product in R&D

Table 4.27: Role of new technologies in pharma R&D

Options	No. of Respondents	%
Study and Evaluation of Technological Innovations to compete in the market	14	17.5%
Helps in Development of New Products through In-House R&D to meet the unmet need	18	22.5%
Better understanding of Patents and Intellectual Property Rights	9	11.3%
All the above	47	58.8%

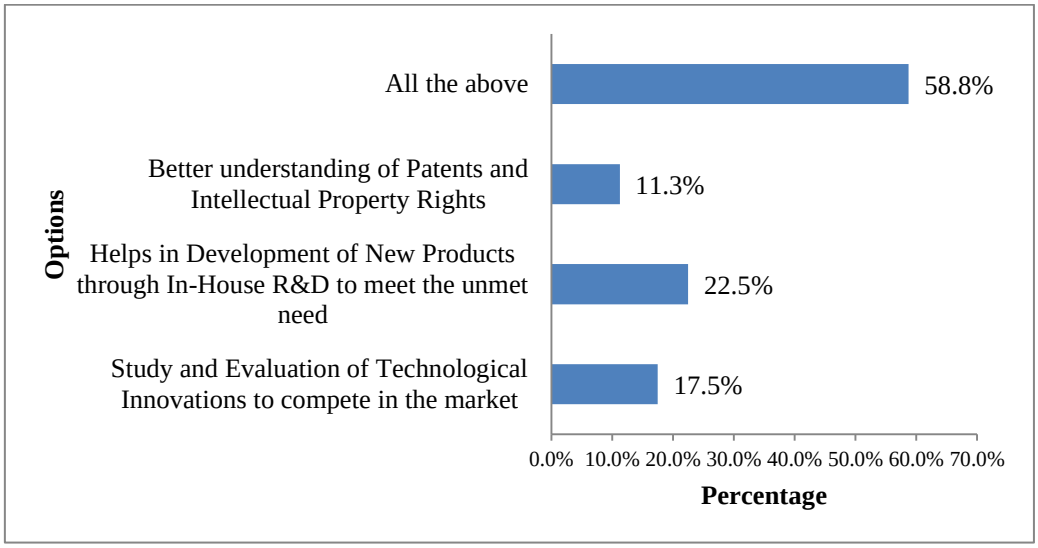

Figure 4.27: Role of new technologies in pharma R&D

Research and development is one of the key department responsible to improve the product, adding new features and making the product better to compete in the market. In this study, some respondents felt that understanding of patents helps in development of new products to meet the unmet needs of the patients. Around 61% respondents accepted that all of the above options in the current study and it echoes the findings from the secondary research where the researcher could identify some of the underlying factors for a pharma companies to adopt the latest tools in the area of new drug and generic drugs development. It was also found that requirement of capital to go digital in this function, but considering the benefits medium sized companies should adopt these tools in a phase wise manner in case of less resources.

27. Reasons for failure of Medium sized Indian pharma companies in Global markets in spite of good market growth & potential

Table 4.28: Reasosn for failure of some medium sized pharma companies in global markets

Options	No. of Respondents	%
Failure to obtain export counseling and to develop a master international marketing plan before starting an export business	11	13.8%
Not committed to adopt the technological changes in Manufacturing, Regulatory affairs & Marketing	29	36.3%
Lack of resources and right portfolio to compete in the market	40	50.0%
Not partnering with strong local partner or distributor	11	13.8%
All of the above	40	50.0%

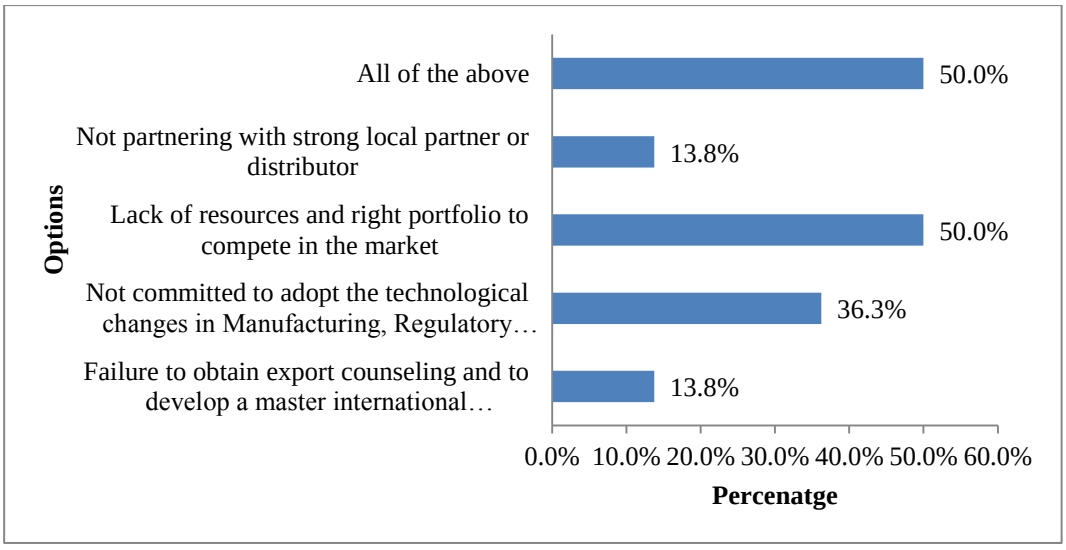

Figure 4.28: Reasons for failure of some medium sized pharma companies in global markets

Around 36% respondents felt that companies are not committed to adopt the technological changes in manufacturing, regulatory affairs & marketing and around 50% respondents suggest that all of the above option. Many medium sized Indian pharmaceutical companies could not become successful in Global markets in spite of good market growth & potential. Global markets offer plenty of opportunities along with diverse complexities. Failure to identify the complexities will lead to the failure in global markets. As per the findings from both primary and secondary research some of the factors like benchmarking the standards to the global companies, following successful company strategy and customized approach to every aspect of the business.

28. Role of e-commerce in the era of globalization

Table 4.29: Role of e-commerce in the era of globalization

Options	No. of Respondents	%
It helps in evolution of Company and the readiness for exports	3	3.8%
Helps in reaching the clients/ customers globally with less resources	27	33.8%
Increases the visibility there by enhancing the brand image and sales	14	17.5%
Right medium for showcasing the capabilities/ strengths and communicating the vision of the company	11	13.8%
All of the above	43	53.8%

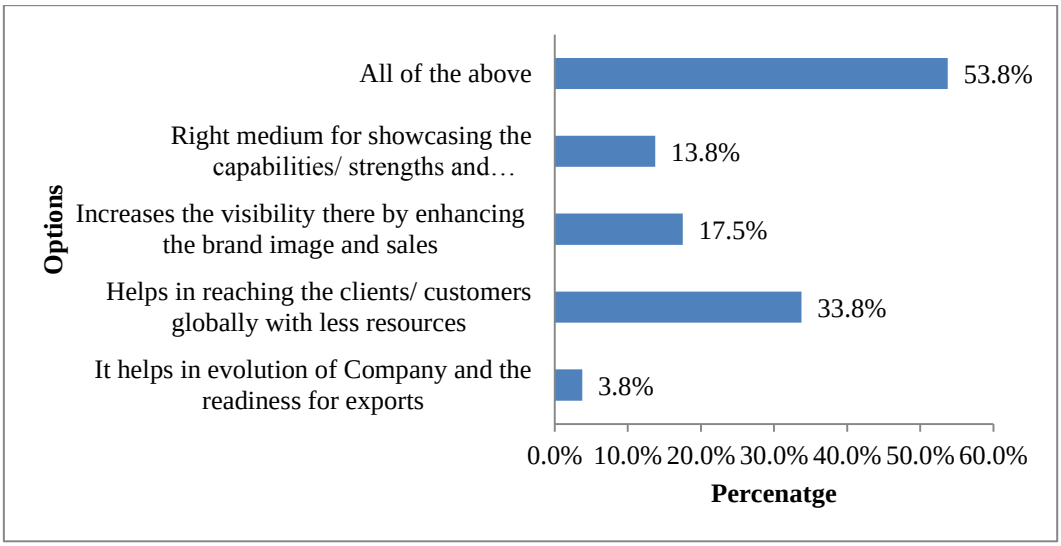

Figure 4.29: Role of e-commerce in the era of globalization

More than 50% respondents agreed that all of the above option and more than 30% respondents agreed that e-commerce helps in reaching the clients/ customers globally with fewer resources. E-Commerce is the recent phenomenon and research has proven that this phenomenon has changed the way the world is moving. When it comes to exports, the company can reach the target customers irrespective of the location of the company. There are numerous articles reveals that every sector of the industry has utilized the e-commere platform to establish the company image, building brand and generating revenues to make the company noticeable, sustainable and profitable. Findings from this question further re-inforce the need of e-commerce to medium sized company and it is one of the most affordable and viable digital tool available.

29. Stand of the medium sized company in investing in R&D bearing the fact that larger companies are well ahead in the game of R&D because they are highly resourceful

Table 4.30: R&D investment by medium sized companies

Options	No. of Respondents	%
Lack of financial & technical resources to develop new products to meet the market demand	30	37.5%
They can still be in the game if they go for strategic partnership with highly focused business/ products with global companies	28	35.0%
To leverage on the available resources and take a calculative risk to expand in to R&D	12	15.0%
Failing in understanding that they will have long term gains	12	15.0%
All of the above	40	50.0%

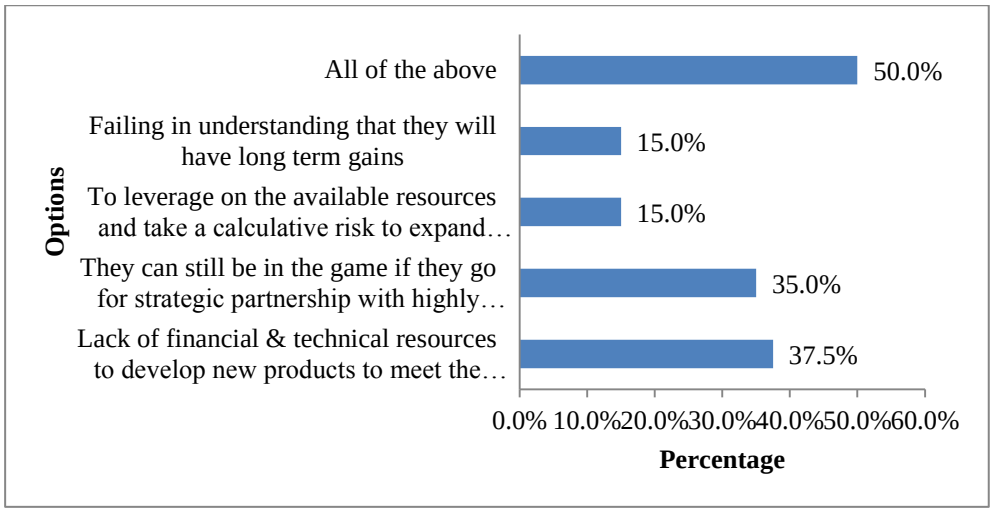

Figure 4.30: R&D investment by medium sized companies

Around 35% respondents agreed that medium sized companies can still be in the game if they go for strategic partnership with highly focused business/ products with global companies and around 50% respondents agreed that all of the above options. However around 15% respondents felt that there is always resource constraints for medium sized companies because of financial standings. Case studies of several Indian companies' reveals the focus and investment in R&D activities have helped them to position as research driven organization to develop new and differentiated products. Hence, apart from market capitalization, the findings suggest that collaboration of medium sized companies with the regional companies can bring in investments for developing newer products.

30. Game plan that you suggest for the medium sized pharmaceutical companies planning to enter the highly competitive and dynamic global market

Table 4.31: Game plan for medium sized companies to enter global markets

Options	No. of Respondents	%
Get the best Management team and develop long term business plan	26	32.5%
Right product and market mix	26	32.5%
Strategic Marketing Plan coupled with Brand Promotion	26	32.5%
Digitalizing end to end services	11	13.8%
All of the above	43	53.8%

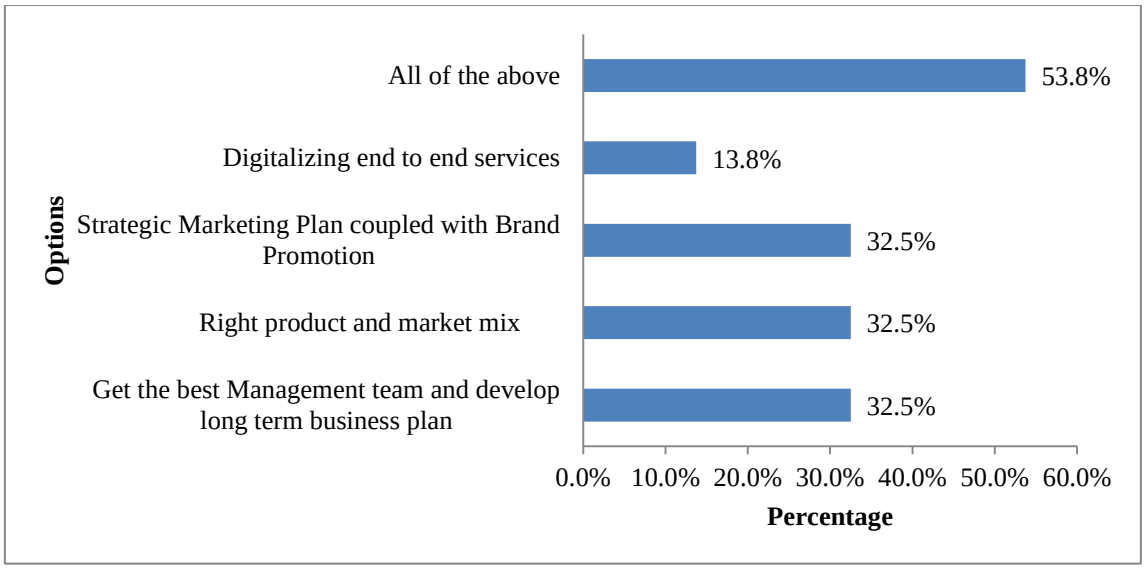

Figure 4.31: Game plan for medium sized companies to enter global markets

More than 50% respondents accepted all the above options with equal importance to strategic marketing, marketing plan with brand promotion with a right team in place to implement the strategy and other factors like right product and matrix mix are also considered for the success. Around 13% felt that digitalizing end-to-end services is also one of the factor. Based on the findings, it is recommended to consider phase wise approach of digital implementation instead of one time adoption in case of resource challenges. As per the findings from literature review, global markets are highly competitive and to become successful the medium sized companies should have a balanced approach with respect to the products and digital strategy.

31. Positive changes that you would expect if an organization goes digital

Table 4.32: Positive changes with digitalization

Options	No. of Respondents	%
International standards in terms of Operations, Human Resources etc.	17	21.3%
Changes the phase and pace of the business and the mode of operations.	17	21.3%
It helps in up gradation of technology and exchange of technology.	12	15.0%
It helps to have a competitive edge advantage in Marketing and increasing bottom line.	17	21.3%
All of the above	38	47.5%

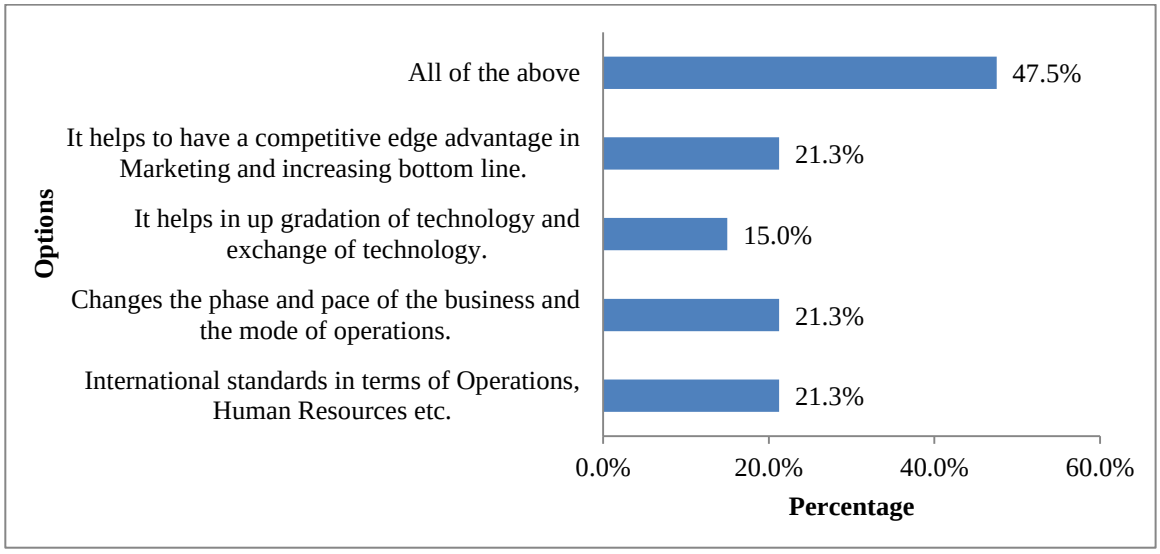

Figure 4.32: Positive changes with digitalization

Around 50% respondents felt that digitalization process would bring rewarding changes in business model, market competitiveness and technology transformation. It was also evident from the observations that the new wave of digital transformation will transform the organizational culture by attracting best in class human resource. These changes will help an organization to position as a global company with difference, which will enhance the pace of the business and mode of operations. Findings from the secondary research confirms the observations and the companies enjoy the benefits of digitalization in the long term in the form of improved brand equity and customer loyalty. It has been proven with many such examples in the literature review.

32. Medium sized pharma companies are capable of implementing cost intensive digital platforms

Table 4.33: Capability of implementation of digital process my medium sized companies

Options	No. of Respondents	%
Yes	53	66.25%
No	9	11.25%
Can't Say	18	22.5%
Total	**100**	**100%**

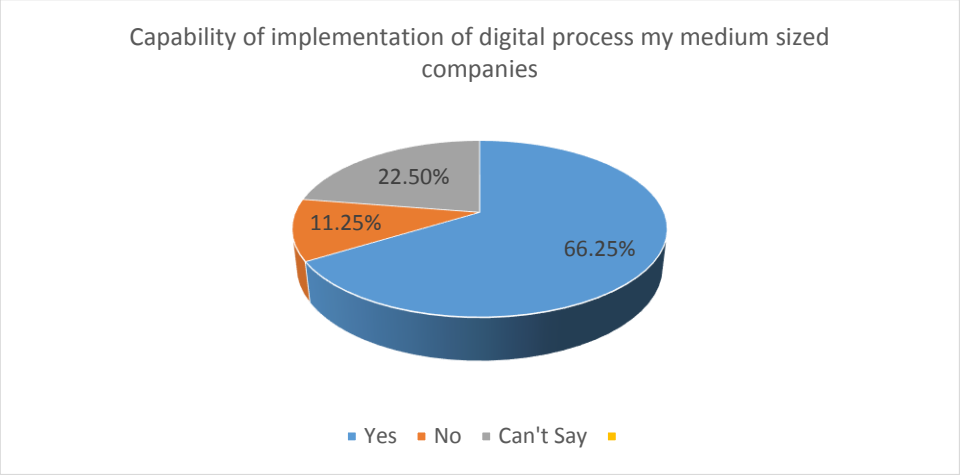

Figure 4.33: Capability of Implementation of digital process by medium sized companies

Around 66% respondents stated that the medium sized companies could afford to go for cost intensive digital platforms. This proves the hypothesis based on the secondary research. However, the respondents felt that digitalization needs to be driven by the management with utmost passion. It is rewarding for the organization when the digital process happens in the selected functional domains to augment the company's current strength. For example, if a marketing focused company wants to build a global brand, it should invest in digital marketing. If a contract manufacturing company wants to optimize the manufacturing process then it should invest in digitalization of SCM function. This might be a reason for considerable number of participants responded as cannot say for an integrated digitalization across all verticals.

Around 11% responded that medium scale companies could not afford to go for digitalization due to cost implications. They may have expressed their views based on their traditional attributes and management styles who are called as change resisters and would like to live in status quo.

33. Impact of digital strategy on the outlook and performance of human resource

Table 4.34: Impact of digital strategy on human resource

Options	No. of Respondents	%
Migration from people to process run organization	13	16.3%
Increases accountability and ownership there by increasing the output	17	21.3%
Helps in connecting, communicating and collaborating across the Organization	25	31.3%
Defines Roles and responsibilities of all employees	10	12.5%
All of the above	41	51.3%

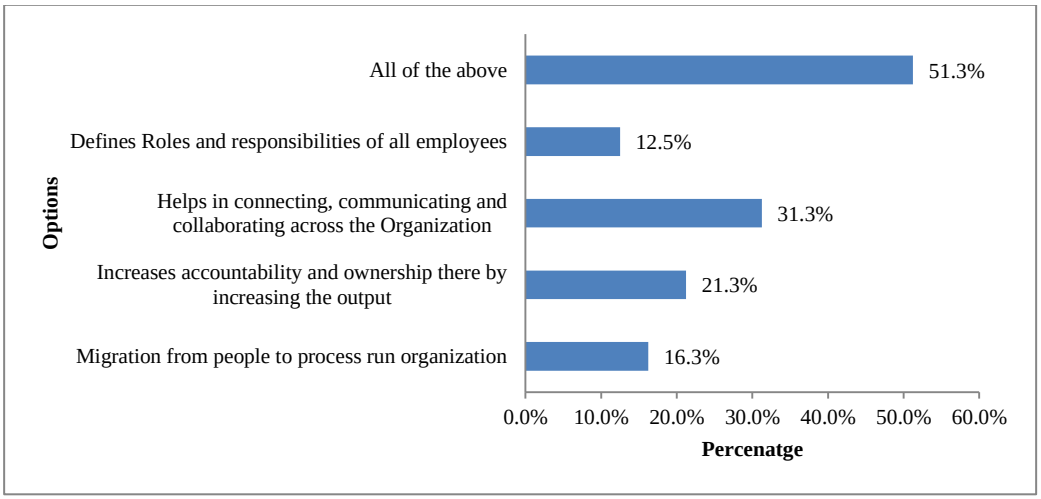

Figure 4.34: Impact of digital strategy on human resource

More than 50% respondents agreed that organization's digital strategy would affect the outlook of human resource by bringing clarity on roles and responsibilities, transparent communication and making each individual accountable for his own performance. This will in turn improve the work culture and productivity of human resources. It was interesting to know that more than 30% participants felt that digitalization process helps in connecting, communicating and collaborating seamlessly across the organization again establishes that use of social media and cloud networking platforms are efficient tools for this purpose. Based on the findings from the secondary research, it is further strengthens the idea of going digital for an organization. It is further confirmed in this research that an organization should move towards the process driven using the digital tools instead of people driven.

34. Pharmaceutical companies will only succeed if they embrace the technology based solutions and incorporate it as strategic option across functional domains

Table 4.35: Success of Pharma companies with adoption of digital tools across domains

Options	No. of Respondents	%
Yes	58	72.5%
No	12	15%
Can't say	10	12.5%
Total	**100**	**100%**

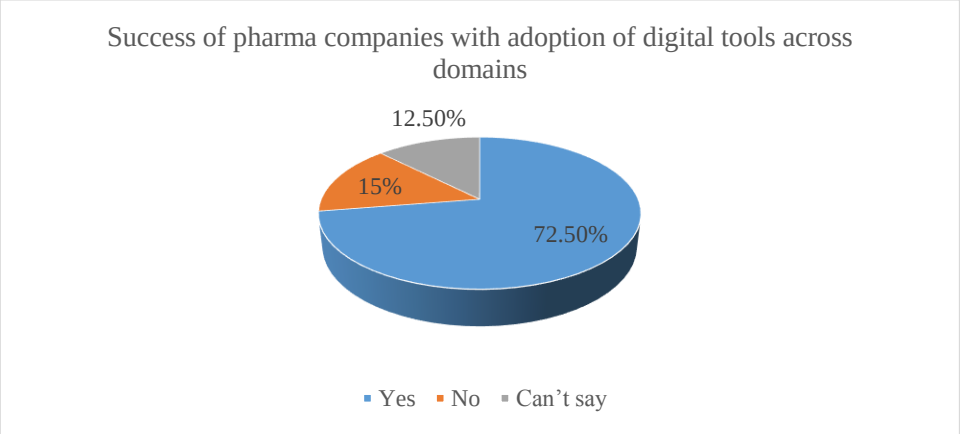

Figure 4.35: Success of Pharma companies with adoption of digital tools across domains

72.5% respondents say YES to this question. Whether the respondents company is currently embracing the digital strategies or not, majority of the respondents feel that only digitalization will improve the brand visibility, business sustainability, operational efficiency, productivity across all functions. Even though there are restrictions to use digital platforms for marketing and advertising products directly to the public, many companies established and invented its own ways of using digital platforms to reach the target customers.

Pharma industry is a capital-intensive business with a longer gestation period and regulatory challenges to commercialize the products, of late digital tools have helped companies to overcome these challenges as per the literature review. Hence, the findings from this question strongly support the hypothesis of this study.

35. Digital strategy is the need of the hour as well as future and it should be considered as a corporate strategy

Table 4.36: Digital is the need of the hour and to be considered as corporate strategy

Options	No. of Respondents	%
Yes	70	92.5%
No	0	1.25%
Can't say	10	6.25%
Total	100	100%

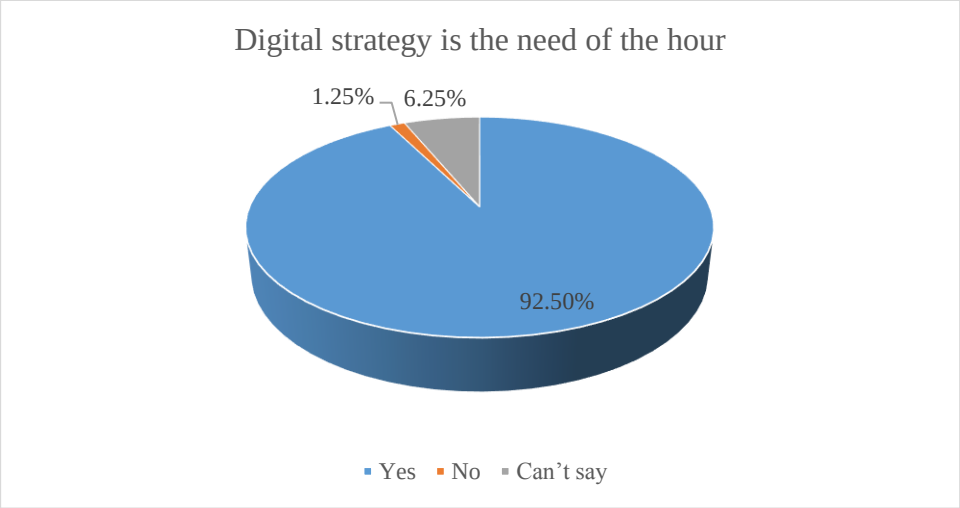

Figure 4.36: Digital is the need of the hour and to be considered as corporate strategy

Without any hesitation, almost all the respondents (92.5%) agreed that the digitalization is the need of an hour for medium sized pharma companies in the pursuit of globalization. It was observed that 6.25% participants responded with can't say option because of the apprehensions over the company's financial status and technical competencies to implement the digitalization process. During the literature survey, the researcher encountered with many such evidences proving the above statement and clearly captured in the literature review. With the facts and findings from both primary and secondary research and researcher's own experience, the researcher further reiterate the need of digital platforms to be considered by the medium sized pharma companies. Considering the challenges and resources required to adopt digital tools across all cross-functional departments, a company can achieve it, if it is viewed as a strategic task and implement it as a "Digital Strategy".

36. Importance of digital strategy as a successful tool in long term

Table 4.37: Importance of digital strategy as a successful tool in long term

Options	No. of Respondents	%
To build a successful and profitable global organization	23	28.8%
To increase the revenues from Global markets	13	16.3%
Helps in developing new products and building a strong manufacturing base	11	13.8%
All of the above	47	58.8%

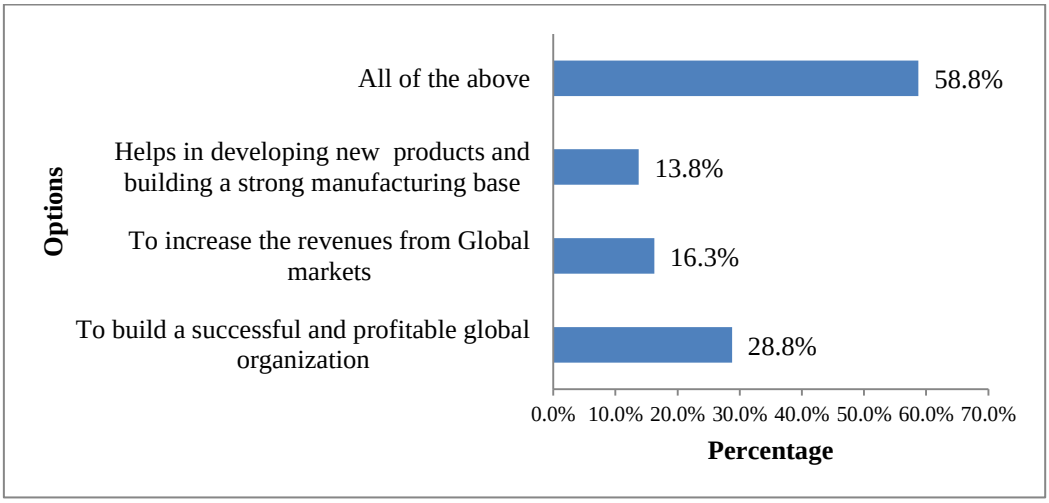

Figure 4.37: Importance of digital strategy as a successful tool in long term

It was found that, 58.8% respondents opted for all of the above options, which was also observed in the secondary research. Digital strategy for sure will drive the organization success in long term because it helps in developing new products, which will increase the revenues from global markets. Huge infrastructure will help to expand global operations and makes the organization successful and profitable in the long term. It is very well substantiated with the literature review, that the digitalization process across various industries and geographies helped the organizations to grow their volume and value of business in long term. Case study of global and Indian pharma companies too have proved the above hypothesis.

Considering the above observations, facts and findings, researcher suggests that, if a medium sized Pharma Company would like to expand in to global markets, it should consider adopting the apt digital tools as a part of their transformation towards end-to-end implementation of digital strategy.

4.3 Chi – Square Analysis

Using SPSS software, Chi-square test was done to get the p values of the below mentioned 4 questions directly linked to the Hypothesis of the current study.

Question 18: Digital marketing is essential for pharmaceutical companies

Table 4.38: Digital marketing is essential for Pharma companies

Options	No. of Respondents	%
Yes	56	70.00%
No	9	11.25%
Can't Say	15	18.75%
Total	80	100%

Table 4.39 - Q18 – Designation in the company

Option	Your designation in the company				Total	p value
	General Manager Cadre	Manager Cadre	Promoter/ Management/ Board	Vice President Cadre		
Yes	10	24	15	7	56	0.049
No	4	0	2	3	9	
Can’t Say	7	4	2	2	15	
Total	21	28	19	12	80	

Table 4.40 - Q18 – Educational background

Option	Educational Background		Total	p value
	Degree	Master’s Degree & Above		
Yes	7	49	56	0.008
No	5	4	9	
Can’t Say	3	12	15	
Total	15	65	80	

Table 4.41 - Q18 – Age group

Option	Age group (Years)			Total	p value
	30-40	40-50	50 & above		
Yes	25	22	9	56	0.031
No	0	8	1	9	
Can’t Say	9	5	1	15	
Total	34	35	11	80	

Table 4.42 - Q18 – Type of company

Option	Type of your company				Total	p value
	Partnership company	Privately held company	Proprietorship company	Public listed company		
Yes	4	25	7	20	56	0.011
No	0	6	0	3	9	
Can't Say	5	2	1	7	15	
Total	9	33	8	30	80	

Table 4.43 - Q18 – Experience level in pharma industry

Option	Experience Level in Pharma Industry				Total	p value
	10-15 years	15-20 years	20 years & above	5-10 years		
Yes	24	16	9	7	56	0.045
No	2	3	4	0	9	
Can't Say	1	4	7	3	15	
Total	27	23	20	10	80	

Table 4.44 - Q18 – Company size

Option	Your Company Size			Total	p value
	Large (500 crores & above/ annum)	Medium (100 to 500 crores/ annum)	Small (Below 100 crores/ annum)		
Yes	30	11	15	56	0.013
No	8	0	1	9	
Can't Say	3	7	5	15	
Total	41	18	21	80	

Table 4.45 - Q18 – Functional domain

Option	Your functional domain					Total	p value
	Manufacturing	R&D	Sales, Marketing & BD	Supply Chain Management	Techno Commercial		
Yes	2	5	41	4	4	56	0.015
No	1	0	8	0	0	9	
Can't Say	0	4	6	0	5	15	
Total	3	9	55	4	9	80	

Question 32: Medium sized pharmaceutical companies are capable of implementing cost intensive digital platforms

Table 4.46: Medium sized pharmaceutical companies are capable of implementing cost intensive digital platforms

Options	No. of Respondents	%
Yes	53	66.25%
No	9	11.25%
Can't Say	18	22.50%
Total	80	100%

Table 4.47 – Q32 – Designation in the company

Option	Your designation in the company				Total	p value
	General Manager Cadre	Manager Cadre	Promoter/ Management/ Board	Vice President Cadre		
Yes	12	18	18	5	53	0.024
No	5	2	0	2	9	
Can't Say	4	8	1	5	18	
Total	21	28	19	12	80	

Table 4.48 – Q32 – Educational Background

Option	Educational Background		Total	p value
	Degree	Master's Degree & Above		
Yes	9	44	53	0.006
No	5	4	9	
Can't Say	1	17	18	
Total	15	65	80	

Table 4.49 – Q32 – Age group

Option	Age group			Total	p value
	30-40	40-50	50 & above		
Yes	29	19	5	53	0.023
No	1	5	3	9	
Can't Say	4	11	3	18	
Total	34	35	11	80	

Table 4.50 – Q32 – Type of company

Option	Type of your company				Total	p value
	Partnership company	Privately held company	Proprietorship company	Public listed company		
Yes	4	25	5	19	53	0.011
No	4	2	2	1	9	
Can't Say	1	6	1	10	18	
Total	9	33	8	30	80	

Table 4.51 – Q32 – Experience level

Option	Experience Level in Pharma Industry				Total	p value
	10-15 years	15-20 years	20 years & above	5-10 years		
Yes	22	13	12	6	53	0.008
No	2	1	2	4	9	
Can't Say	3	9	6	0	18	
Total	27	23	20	10	80	

Table 4.52 – Q32 – Company size

Option	Your Company Size			Total	p value
	Large (500 crores & above/ annum)	Medium (100 to 500 crores/ annum)	Small (Below 100 crores/ annum)		
Yes	30	8	15	53	0.047
No	4	5	0	9	
Can't Say	7	5	6	18	
Total	41	18	21	80	

Table 4.53 – Q32 – Functional domain

Option	Your functional domain					Total	p value
	Manufacturing	R&D	Sales, Marketing & BD	Supply Chain Management	Techno Commercial		
Yes	1	7	37	1	7	53	0.023
No	2	2	4	1	0	9	
Can't Say	0	0	14	2	2	18	
Total	3	9	55	4	9	80	

Q 34: Pharmaceutical companies will succeed if they embrace the technology based solutions and incorporate it as their strategic options across functional domains.

Table 4.54: Pharmaceutical companies will succeed if they embrace the technology based solutions and incorporate it as their strategic options across functional domains.

Options	No. of Respondents	%
Yes	58	72.50%
No	12	15.00%
Can't say	10	12.50%
Total	80	100%

Table 4.55 – Q34 – Designation in the company

Option	Your designation in the company				Total	p value
	General Manager Cadre	Manager Cadre	Promoter/ Management/ Board	Vice President Cadre		
Yes	12	23	13	10	58	0.0433
No	7	2	1	2	12	
Can't Say	2	3	5	0	10	
Total	21	28	19	12	80	

Table 4.56 – Q34 – Educational Background

Option	Educational Background		Total	p value
	Degree	Master's Degree & Above		
Yes	10	48	58	0.009
No	0	12	12	
Can't Say	5	5	10	
Total	15	65	80	

Table 4.57 – Q34 – Age Group

Option	Age group			Total	p value
	30-40	40-50	50 & above		
Yes	25	26	17	58	0.021
No	6	4	2	12	
Can't Say	3	5	2	10	
Total	34	35	11	80	

Table 4.58 – Q34 – Type of the company

Option	Type of your company				Total	p value
	Partnership company	Privately held company	Proprietorship company	Public listed company		
Yes	9	20	7	22	58	
No	0	10	1	1	12	0.012
Can't Say	0	3	0	7	10	
Total	9	33	8	30	80	

Table 4.59 – Q34 – Experience Level in Pharma Industry

Option	Experience Level in Pharma Industry				Total	p value
	10-15 years	15-20 years	20 years & above	5-10 years		
Yes	19	13	17	9	58	0.000
No	0	10	2	0	12	
Can't Say	8	0	1	1	10	
Total	27	23	20	10	80	

Table 4.60 – Q34 – Your company size

Option	Your Company Size			Total	p value
	Large (500 crores & above/ annum)	Medium (100 to 500 crores/ annum)	Small (Below 100 crores/ annum)		
Yes	30	8	20	58	0.003
No	8	4	0	12	
Can't Say	3	6	1	10	
Total	41	18	21	80	

Table 4.61 – Q34 – Functional domain

Option	Your functional domain					Total	p value
	Manufacturing	R&D	Sales, Marketing & BD	Supply Chain Management	Techno Commercial		
Yes	1	7	41	3	6	58	0.031
No	0	2	10	0	0	12	
Can't Say	2	0	4	1	3	10	
Total	3	9	55	4	9	80	

Q 35: Digital strategy is the need of the hour as well as future and it should be considered as a corporate strategy

Table 4.62: Digital strategy is the need of the hour as well as future and it should be considered as a corporate strategy

Options	No. of Respondents	%
Yes	74	92.50%
No	1	1.25%
Can't say	5	6.25%
Total	80	100%

Table 4.63 – Q35 – Designation in the company

Option	Your designation in the company				Total	p value
	General Manager Cadre	Manager Cadre	Promoter/ Management/ Board	Vice President Cadre		
Yes	20	28	17	9	74	0.0321
No	1	0	0	0	1	
Can't Say	0	0	2	3	5	
Total	21	28	19	12	80	

Table 4.64 – Q35 – Educational background

Option	Educational Background		Total	p value
	Degree	Master's Degree & Above		
Yes	12	62	74	0.046
No	1	0	1	
Can't Say	2	3	5	
Total	15	65	80	

Table 4.65 – Q35 – Age group

Option	Age group			Total	p value
	30-40	40-50	50 & above		
Yes	29	35	10	74	0.009
No	0	0	1	1	
Can't Say	5	0	0	5	
Total	34	35	11	80	

Table 4.66 – Q35 – Type of company

Option	Type of Your Company				Total	p value
	Partnership company	Privately held company	Proprietorship company	Public listed company		
Yes	7	33	5	29	74	0.000
No	0	0	1	0	1	
Can't Say	2	0	2	1	5	
Total	9	33	8	30	80	

Table 4.67 – Q35 – Experience level

Option	Experience Level in Pharma Industry				Total	p value
	10-15 years	15-20 years	20 years & above	5-10 years		
Yes	27	22	19	6	74	0.000
No	0	1	0	0	1	
Can't Say	0	0	1	4	5	
Total	27	23	20	10	80	

Table 4.68 – Q35 – Company size

Option	Your Company Size			Total	p value
	Large (500 crores & above/ annum)	Medium (100 to 500 crores/ annum)	Small (Below 100 crores/ annum)		
Yes	40	14	20	74	0.021
No	1	0	0	1	
Can't Say	0	4	1	5	
Total	41	18	21	80	

Table 4.69 – Q35 – Functional domain

Option	Your functional domain					Total	p value
	Manufacturing	R&D	Sales, Marketing & BD	Supply Chain Management	Techno commercial		
Yes	2	9	53	1	9	74	0.000
No	0	0	1	0	0	1	
Can't Say	1	0	1	3	0	5	
Total	3	9	55	4	9	80	

4.4 Data Collection, Presentation and Analysis – Phase II Study

Considering that the data set is small, which further requires categorization on size of the enterprise, I have shunned using traditional multivariate statistical analysis such as regression / discriminant analysis considering the inadequacy of data in detecting possible effects if present in population. On the other hand, I have used neural network analysis, a nonlinear algorithm to fit the model. Below are the advantages of fitting a neural network (NN) over traditional regression based algorithms (RBA) (Tu, 1996):

1. While traditional regression based model assumes linearity in data, NN models for nonlinearity
2. RBA fits the data according to a preconceived model, while NN fits the model according to the dispersion of data
3. RBA are traditional algorithms that do not update based on feedback. NN is an advanced machine learning algorithm that updates the weights of the coefficients based on incoming data
4. Since NN fit the model according to the data, classification accuracy, R square of NN is always higher than RBAs
5. NN can be run on small samples as well as large samples, while regression requires a relatively large sample size for unbiased estimation of coefficients.

However, NN also has few short comings compared to RBA:

1. While NN displays importance score for each variable, it does not display the regression weight considering closed system approach to estimation
2. NN solutions are not stable. Every time a neural network is run, a different solution is evidenced. To stabilize the solution, random seed has to be fixed to a particular number.

Considering that the objective of this research is limited to assessing the relative importance of various independent variables, researcher preferred using NN based model.

Model I: Objective of first NN model is to find out the relative importance of different digital strategy implementation motivations across firm sizes. While motivations served as independent variables, relative assessment of competitive advantage incurring due to

implementation of digital strategy served as dependent variable (Q9). This analysis was independently carried across three firm sizes. The results are as follows:

Table 4.70: Prediction accuracy of Model I

Sample (random seed = 400)		SMALL FIRMS			MEDIUM FIRMS			LARGE FIRMS		
		Predicted			Predicted			Predicted		
		No	Yes	Percent Correct	No	Yes	Percent Correct	No	Yes	Percent Correct
Observed	No	6	0	100.0%	8	0	100.0%	9	0	100.0%
	Yes	0	7	100.0%	0	7	100.0%	1	12	92.3%
	Overall Percent	46.2%	53.8%	100.0%	53.3%	46.7%	100.0%	45.5%	54.5 %	95.5%

Table 4.71: Ranking of motives across firm sizes

Variable Importance	SMALL FIRMS			MEDIUM FIRMS			LARGE FIRMS		
	Importance	Normalized Importance	Ranking	Importance	Normalized Importance	Ranking	Importance	Normalized Importance	Ranking
Market Penetration Motive	.116	45.3%	5	.026	9.0%	6	.223	100.0%	1
Brand Equity Motive	.061	23.9%	7	.162	55.0%	4	.150	67.0%	4
Customer Interaction Motive	.079	30.6%	6	.134	45.5%	5	.038	17.2%	7
Data Management	.121	47.1%	3	.014	4.7%	7	.195	87.2%	3
Productivity	.144	56.2%	4	.294	100.0%	1	.116	52.2%	5
Global Standards	.257	100.0%	1	.196	66.5%	2	.055	24.7%	6
Agility	.223	86.8%	2	.174	59.0%	3	.222	99.6%	2

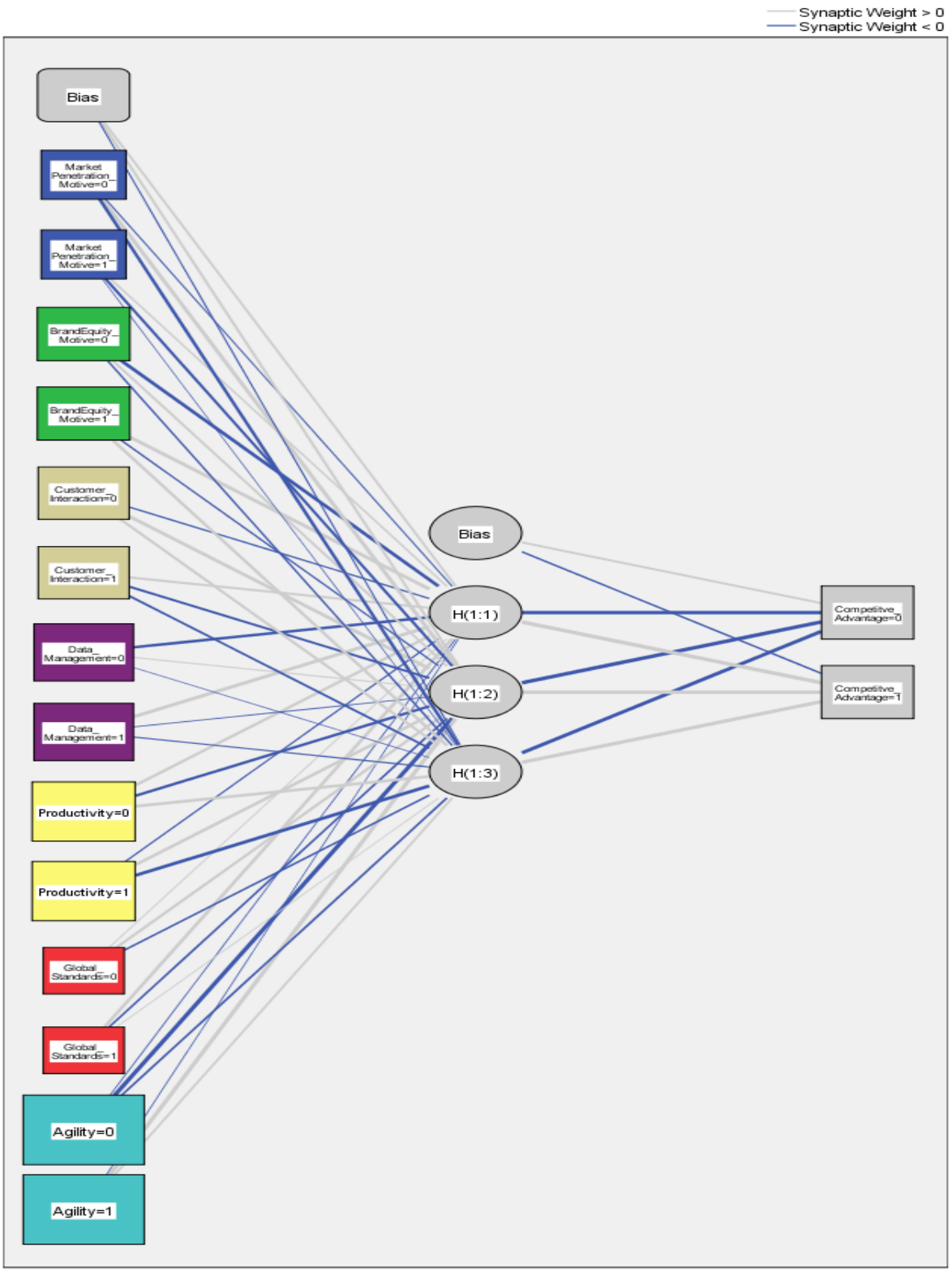

Figure 4.38: Neural Network Analysis of Ranking of motives across firm sizes

Model II: Objective of second NN was to find out the relative importance of contributors to long term success of digital intervention strategy. For this model q12 served as dependent variable while q9, q10, q11 served as independent variables. Results are as follows:

Table 4.72: Prediction accuracy of Model II

Sample (Random seed = 4000)		SMALL FIRMS			MEDIUM FIRMS			LARGE FIRMS		
		Predicted			Predicted			Predicted		
		No	Yes	Percent Correct	No	Yes	Percent Correct	No	Yes	Percent Correct
Observed	No	0	1	0.00%	3	4	42.86%	4	1	80.00%
	Yes	0	12	100.00%	2	6	75.00%	2	13	86.67%
	Overall Percent	0.00%	100.00%	92.31%	33.33%	66.67%	60.00%	30.00%	70.00%	85.00%

Table 4.73: Ranking of contributors across firm sizes

Variable Importance	SMALL FIRMS			MEDIUM FIRMS			LARGE FIRMS		
	Importance	Normalized Importance	Ranking	Importance	Normalized Importance	Ranking	Importance	Normalized Importance	Ranking
Digital Strategy @ Corporate Level				.735	100.0%	1	.348	70.0%	2
Digital Intervention Capability of the Firm	.401	67.1%	2	.063	8.5%	3	.498	100.0%	1
Belief that Digital Strategy leads to Competitive Advantage	.599	100.0%	1	.202	27.5%	2	.154	30.9%	3

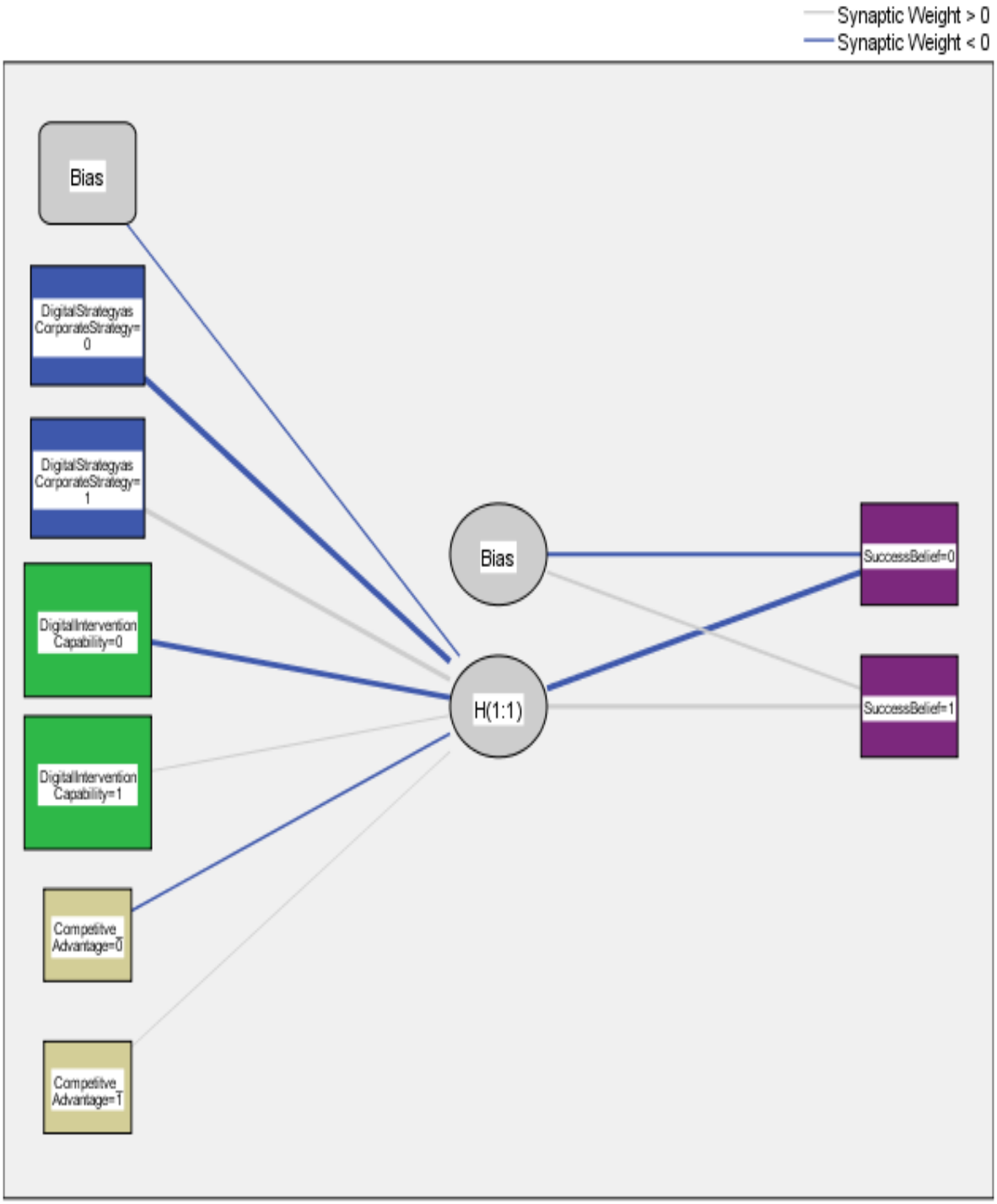

Figure 4.39: Neural Network Analysis of Ranking of contributors across firm sizes

4.5 Data Interpretation

Model 1: Interpretation

The contributing factors for competitive advantage (Independent variable) due to adopting digital strategy differ in each case of small, medium and large firms. Motivations served as *independent variables*, relative assessment of competitive advantage served as *dependent variable.*

In case of Small firms, the top 3 digital strategy motivations are:

- To attain global standards – Quality and regulatory compliance
- Agility – Speed of operations
- Data management – for streamlining various functional domains

Followed by

- Productivity
- Customer interaction
- Market penetration
- Brand equity

This is clear that Small firms are aiming to gain competitive advantage by using digital strategy with focus on speed, accuracy in data management and benchmarking themselves with global standards.

In case of Medium sized firms, the Top 3 digital strategy motivations are:

- Productivity
- Agility
- Attaining Global standards

Followed by

- Brand Equity
- Customer Interaction

- Market Penetration and
- Data Management

When compared to small firms the Digital Motives of medium scale companies is more on productivity (manufacturing efficiency) Global Standards (Quality & regulatory compliance concern) and Agility (speed of operations)

If we look at the next important motives, we can say that the medium scale companies' motives are in the area of building its own strengths in marketing and brand building where they want to step up and compete in the market space to gain competitive advantage.

In case of large sized firms, the top 3 digital strategy motivations are:

- Market Penetration (across different markets & product lines)
- Agility (speed)
- Data Management (in various domains of marketing)

Followed by

- Brand Equity
- Productivity
- Global Standards
- Customer Interaction

For large scale companies the motives are different compare to small and medium sized firms because these companies have efficient manufacturing. In case of large companies the main motive is market penetration with speed and accuracy of Data (on market intelligence) and brand equity. This clearly explains that large companies are expecting to use digital strategies to expand their markets, product lines and building brands.

To summarize, we can observe from the group of respondents the following size specific motives for using digital strategy for attaining competitive advantage:

Small sized companies: Intending to attain global standards in shortest possible time with the help of digital strategy

Medium sized companies: Intending to use digital strategy to increase productivity, global standards in quality and regulatory compliance

Large sized companies: Having attained certain level of global standards in terms of regulatory compliance and manufacturing, these companies' motives for digital strategy are in penetrating market across various markets and with different product lines.

Model 2 Interpretation

There are three contributors mentioned below are used in the question to check the relative importance across small, medium and large sized companies. In this model *Success Belief* has served as *Dependent Variable* and the *Contributors* served as *Independent Variables.*

- Digital strategy at corporate level
- Digital intervention capability of the firm
- Success belief - Implementing digital strategy contributes to long term success

Interpretation of the results of neural network analysis finds out the relative importance of various contributors to long term success of digital intervention strategy.

Small sized firms: Respondents felt that digital strategy lead to success and firm's implementation ability comes next. It speaks about the general environment in the small sized firms on their intent to go for digital strategy.

Medium sized firms: Respondents from Medium size firms opinioned that adopting a corporate level digital strategy is the most important followed by belief that digital strategy will give competitive advantage and Ability of the firm to implement digital strategy.

Large sized firms: Having some experience in the digital strategy implementation, the respondents gave importance to company's digital intervention capabilities followed by Digital strategy at corporate level and belief that digital strategy will give competitive advantage. Large firm's respondents have some hands on experience, so they are more practical in their approach.

CHAPTER V

HYPOTHESIS TESTING, FINDINGS AND CONCLUSION

5.1 Hypothesis Testing

Hypothesis testing is done substantiating the data from secondary sources, response from the participants in % value. Further, to test the results statistically, p values are taken in to consideration for all the demographic categories of the participants in the study.

Hypothesis - I: Medium sized pharmaceutical companies are capable of implementing cost intensive digital platforms

H_0: Medium sized pharma companies are not capable of implementing cost intensive digital platforms

H_A: Medium sized companies are capable of implementing digital platforms

Table 5.1: Medium sized pharma companies capable to implement digital platforms

Options	No. of Respondents	%
Yes	53	66.25%
No	9	11.25%
Can't Say	18	22.5%

More than 66% respondents stated that the medium sized companies could afford to go for cost intensive digital platforms. This proves the hypothesis stated by the researcher based on the secondary research. However, the respondents felt that digitalization needs to be driven by the management with utmost passion. It is rewarding for the organization when the digital process happens in the selected functional domains to augment the company's current strength. For example, if a marketing focused company wants to build a global brand, it should invest in digital marketing. If a contract manufacturing company wants to optimize the manufacturing process then it should invest in digitalization of SCM function. This might be a reason for considerable number of participants responded as cannot say for an integrated digitalization across all verticals.

Around 16.3% responded that medium scale companies could not afford to go for digitalization due to cost implications. They may have expressed their views based on their traditional attributes and management styles that are called as change resisters and would like to live in status quo.

Table 5.2: p values of Hypothesis - I

Demographics	Designation in the Company	Educational Background	Age Group	Type of Your Company	Experience level in Pharma Industry	Company Size	Functional Domain
p Value	0.0433	0.009	0.021	0.012	0.000	0.003	0.031

Further to test the results statistically, p values are taken in to consideration for all the demographic categories as mentioned in table 5.2.

Across all categories p values found to be < 0.05. So, we can reject the null hypothesis ($\mathbf{H_0}$) Medium sized pharma companies are not capable of implementing cost intensive digital platforms and consider to accept the alternative hypothesis ($\mathbf{H_{A)}}$ Medium sized companies are capable of implementing digital platforms.

Hypothesis - II: Pharma companies will succeed if they embrace the technology based solutions and incorporate it as their strategic options across functional domains.

$\mathbf{H_0}$: Pharma companies can sustain by not adopting technology based solutions as an integral part of their strategic planning for various functional domains.

$\mathbf{H_A}$: Pharmaceutical companies can sustain only by adopting technology based solutions as an integral part of their strategic planning for various functional domains.

Table 5.3: Pharma companies success depends on incorporating technology based solutions across various functional domains

Options	No. of Respondents	%
Yes	58	72.5%
No	12	15.0%
Can’t say	10	12.5%

It is loud and clear YES from more than 72.5% respondents for this question. Whether their company is currently embracing the digital strategies or not, majority of the respondents feel that only digitalization will improve the brand visibility, business sustainability, operational efficiency, productivity across all functions. Even though there are restrictions to use digital platforms for marketing and advertising products directly to the public, many companies established and invented its own ways of using digital platforms to reach the target customers. Pharma industry is a capital-intensive business with a longer gestation period and regulatory challenges to commercialize the products, of late digital tools have helped companies to overcome these challenges as per the literature review. Hence, the findings from this question strongly supports the hypothesis of this study.

Table 5.4: p values of Hypothesis - II

Demographics	Designation in the Company	Educational Background	Age Group	Type of Your company	Experience level in Pharma Industry	Company Size	Functional Domain
p Value	0.034	0.006	0.043	0.000	0.030	0.003	0.048

Further to test the results statistically we have taken p values in to consideration for all the demographic categories as mentioned in table 5.4.

Across all categories p values found to be < 0.05. So, we can reject the null hypothesis (**H_0**) Pharmaceutical companies can sustain by not adopting technology based solutions an integral part of their strategic planning for various functional domains and consider to accept the alternative hypothesis (**H_A**) Pharmaceutical companies can sustain only by adopting technology based solutions an integral part of their strategic planning for various functional domains.

Hypothesis - III: Digital marketing is essential for Pharma companies

H_0: Digital marketing has no relevance for Pharma companies in present day scenario

H_A: Digital Marketing is requirement in present day scenario for Pharma companies.

Table 5.5: Digital marketing essential for Pharma companies

Options	No. of Respondents	%
Yes	56	70%
No	9	11.25%
Can't Say	15	18.75%

Almost all respondents agreed that digital marketing is essential for pharmaceutical companies. As mentioned in table 5.5, very high percentage of respondents (70%) strongly felt the need of digitalization of pharmaceutical companies. A mere 11% of respondents believed that digital marketing was not needed. This proportion of respondents generally belonged to a section of traditional marketing professionals who do not want to update themselves with the latest trends and technologies. 18% of respondents showed mixed response probably because the questionnaires were shared with almost all departments and they might be from different team with less or no experience in marketing. It is evident from the evaluation of Global and Indian companies in the literature review and the study reports suggest that the digital marketing is necessary for pharma companies. Irrespective of the size of the company the digital marketing tools brings in many benefits from enhancing the brand to the market share etc.

Table 5.6: p values of Hypothesis - III

Demographics	Designation in the Company	Educational Background	Age Group	Type of Your Company	Experience level in Pharma	Company Size	Functional Domain
p Value	0.049	0.008	0.031	0.006	0.045	0.013	0.015

Further to test the results statistically we have taken p values in to consideration for all the demographic categories as mentioned in table 5.6.

Across all categories p values found to be < 0.05. So, we can reject the null hypothesis ($\mathbf{H_0}$) Digital marketing has no relevance for Pharma companies in present day scenario and consider to accept the alternative hypothesis ($\mathbf{H_{A)}}$ Digital Marketing is requirement in present day scenario for pharma companies.

Hypothesis - IV: Digital strategy is the need of the hour as well as future and it should be considered as a corporate strategy

H_0: Companies need not consider digitalization as a corporate strategy for present and future requirements

H_A: Companies need to consider digitalization as a corporate strategy for present and future requirements.

Table 5.7: Digital strategy the need of the hour

Options	No. of Respondents	%
Yes	74	92.5%
No	1	1.25%
Can't say	5	6.25%

As per the results in table 5.7 without any hesitation, almost all the respondents (92.5%) agreed that the digitalization is the need of the hour for medium sized Pharma companies in the pursuit of globalization. It was observed that, small group of (6.25 %) participants responded with could not say option because of the apprehensions over the company's financial status and technical competencies to implement the digitalization process. During the literature survey, the researcher encountered with many such evidences proving the above statement and clearly captured in the literature review. With the facts and findings from both primary and secondary research and researcher's own experience, the researcher further reiterate the need of digital platforms to be considered by the medium sized Pharma companies. Considering the challenges and resources required to adopt digital tools across all cross-functional departments, a company can achieve it, if it is viewed as a strategic task and implement it as a "Digital Strategy".

Table 5.8: p values of Hypothesis - IV

Demographics	Designation in the Company	Educational Background	Age Group	Type of Your company	Experience level in Pharma Industry	Company Size	Functional Domain
p Value	0.0321	0.046	0.009	0.001	0.000	0.021	0.000

Further to test the results statistically we have taken p values in to consideration for all the demographic categories as mentioned in table 5.8

Across all categories p values found to be < 0.05. So, we can reject the null hypothesis ($\mathbf{H_0}$) Companies need not consider digitalization as a corporate strategy for present and future requirements and consider to accept the alternative hypothesis ($\mathbf{H_{A)}}$ Companies need to consider digitalization as a corporate strategy for present and future requirements.

In the Phase I research questionnaire, out of 27 questions, 4 questions were given as closed ended ones with an options of Yes/ No/ Can't say to understand the responses of the participants in the study broadly on the above set hypothesis. Total of 80 participants from various demographic categories like age, qualification, years of experience, designation in the company, functional domain, and type of the company and size of the company were part of the study. The responses for these questions provide us a direction on the requirement of digital strategy at large for a pharmaceutical company.

Further Phase II research was conducted and the data was collected from 50 midlevel and above executives working in Pharma companies. These participants were the same sample which was used in phase I of the study. Of those executives who answered phase I and who responded that their organization was either seriously contemplating to pursue digital strategy or already pursuing digital strategy were selected for Phase II research. Out of 50 participants, 13 samples were from small sized companies, 15 from medium sized companies and 22 from large sized companies.

5.2 Research Findings

Through this summary, researcher intend to list out key findings from the study using both primary and secondary data.

a. Global pharmaceutical market to continue to grow:

Outcome of the current study proves that the global pharma market will continue to grow. Almost 64% respondents in the study attributed all of the above listed reasons to the growth of global pharmaceuticals. This question mainly focuses on the perceptions and the view of growth of global pharma industry in future. The future growth prospect will tend the companies to adopt digitalization to have an international presence and the brand image by increasing the market share, productivity and profitability. Some of the key observations like increase in average life expectancy, increase in awareness of health consciousness, increase in literacy rates in developing and underdeveloped countries are some of the key driving factors for growth of global pharma industry. Further, the growth of the industry is also substantiated in literature review. As per the report published by IMS, annual global spending on medicines was expected to reach nearly $1.5 trillion by 2016, as the pharma emerging markets, biologics and generics contribute more to spending (IMS 2012).

b. Globalization to help Indian pharmaceutical companies in global markets:

Over 70% of the respondents agreed that globalization was beneficial in their overall operations and helps to build a global brand that further helps an organization in long run. Global revenues increase the influx of forex in to the country and would help contribute to Indian economy. This development strengthens the industry and on one hand and providing employment on the other. Further globalization brings Glocal culture in an Organization that will change the way it operates. Majority of the respondents are from organizations that operated internationally. In the literature survey, it was found that there are abundant opportunities for Indian pharma companies in Global space provided they adopt the latest technologies. Besides helping increase revenues, the globalization could act as a powerful force for increasing incomes ultimately improving health and well-being (Dollar D, 2001).

c. Medium sized Indian pharma companies in Global markets have good opportunities in global markets:

Above 60% respondents believed that medium sized Indian pharmaceuticals got the right opportunities for their reach in global markets. A good number of respondents believed that India's low cost manufacturing allowed companies to compete with global markets. The opportunities for medium sized Indian pharmaceutical companies in global markets depends on several factors such as leveraging India's low cost manufacturing capabilities, strategic partnerships with regional companies for generic's R&D, leveraging existing portfolio to enter into right markets and collaborate and capitalize on new science. The respondents agreed that the international business lead to collaborative partnerships to develop in many fields of expertise. There are markets and countries where the regulations are minimal and minimal compliances. The manufacturing cost is very low compared to many countries and it will help to promote and sell the brand products in global markets with competitive prices.

Literature survey also confirms the findings of this study. Many others feel there are many influential factors that could impact the pharma industry in future and some of them are intrinsic in nature and some are extrinsic. Indian pharma industry is one of the success story in India and developing countries because in a span of three decades India became world's largest manufacturer of medicines. Some of the key factors are skilled work force, bulk drug production, R&D costs, Patent expiries, geographic expansions, boost from population growth, ageing population, foreign direct investment etc. Based on the in-depth analysis discussed in detail in thesis, due to its strengths and opportunities, Indian pharma will continue to grow provided industry work on to reduce the weaknesses and identify the threats. (Kumar K, 2013)

d. Designations, age group, educational qualifications, experience level and company type play crucial role on implementation of digital strategies

The findings from the survey suggested that majority of respondents belonged to the managerial cadre followed by general managers, top management, and vice-president. More than 85% of respondents were less than 50 years older and for sure, this group was more inclined to the adoption of better technologies for the organization's benefits. Being

in the private sector ensured that the decision making could have been better and faster. Furthermore, company size, employee base and its operation in global/regional markets were important factors that helped adopt digital strategies faster.

e. Process automation and implementation of digital tools in R&D, manufacturing, marketing, distribution, sales, marketing and BD, techno-commercial, supply chain management becomes key factors for success

An automated equipment coupled with right information technology in manufacturing of pharmaceutical products helps to meet the market demand. The entire process could be achieved by minimizing human interventions thereby minimizing errors, maximizing quality and ensuring a consistently better product. The automation could ensure that all regulatory requirements are met real-time. Online systems have brought the entire world together. Online regulatory filings save lot of resources, faster error free approvals, and early entry into markets. In total 63% of respondents believed, that automation and online systems equipped pharmaceutical companies well.

The availability of a big basket of software and customized solutions to the pharmaceuticals companies today make them easier either to pick the best option that suits their requirements or to get the right platform built for them. Various ERP packages like SAP, Oracle etc. help organizations to comply with regulatory bodies as per the respective country and the state. Almost half of the respondents agreed that automation drastically reduces the compliance hassles, as it is not same at all locations. The Automation process helps CIOs and the compliance officers in time saving and cost controls and penalties and legal issues in case of non-compliance issues. The statutory and legal compliance is a serious concern that might affect the brand. There have been several instances where the companies have been forced to shut down due to non-compliance. A platform that could take care of all the compliance issues on one hand and automate the process to generate desired reports ready to be submitted could allow companies to do business legally and ethically without any issues. The automation helps in detailing of the data and the process flow can be controlled at all levels, as the data compiled and tracked is the accurate and error free data. The above findings were also envisaged in the detailed literature survey and available in that chapter.

f. Cloud networking helps to position a medium pharma company as a serious player

With the mushrooming of numerous companies and high competition, the utilization of technologies and process automation at every possible stage has become essential. Time to market a product, plan and effective data management play a key role. The technologies could contain cost and enable faster and better-informed decisions. It also helps direct customer interaction for feedback, which will help in enhancing or upgrading the product. Around 57% of the respondents felt that all the above factors will help the pharma companies connect all departments in single platform. Further it was found in the literature survey that Cloud networking has been adopted by all sectors of the industry and irrespective of size of the organization it is one of the most user-friendly and affordable digital tool available.

g. Business analytical tools are must to become successful in global markets

In current study over 63% respondents agreed that use of appropriate market research software platforms enables to capture information such as markets, compliances, demand for type of products, external and internal environments etc. and this information generates various reports that could aid in decision making of concerned management. It was observed in the literature review that success of some of the major companies has been attributed to the adoption and deployment of right tools and software benefits and importance of adopting digital marketing. In the literature survey chapter it is further elaborated on different types of business analytics and how it has benefited many pharma companies. Medium sized companies can make use of these tools as they can be independently manage without integration in to other departments.

h. Digital marketing is need of an hour and game changer for Pharma company planning to enter and sustain in global markets

Over 70% respondents suggested that Digital marketing is must for a pharma company in the era of digitalization. The importance of digital technologies and their understanding among the respondents were well evaluated through this question. The familiarity of respondents to the latest digital marketing tools was quite evident from the responses. These views were helpful in understanding the way the marketing professionals thought of above

aspects. The respondents were of the view that adoption of digital marketing helped organizations to have operational flexibility both at domestic and international levels. The adoption of the digital marketing tools like e-commerce, websites, search engine options, google searches, social media, etc., helped companies to get the data that is measurable and trackable. This will help in deriving and implementing an ideal sales and marketing strategies that can be tailor-made to products, therapies, regions and countries. Well-planned and customized technologies could help an organization become an intuitive enterprise. There is lot of research done in Digital marketing area and the secondary research suggests that marketing function being a face of the organization, medium sized companies must exploit the digital marketing tools to become more competitive and successful in global markets.

i. Social media help to increase the reach, increase the revenues and helps in building a sustainable brand image in global markets

Respondents in the study agreed that identifying and participating in right groups on Facebook, Twitter and LinkedIn to position the brand with quality videos and promotions. Also, provide content that the target audience is searching would allow pharma companies to utilize social media effectively for a good brand building. It is noteworthy that the strategy for each of the social media platform differs and no one size fits all. It is essential to identify the social media platforms where the target consumer spends more time so that a strategy is devised accordingly.

It is further supported by various articles discussed in literature survey chapter. As per the various articles, this is an era of technology where people spend good amount of time on social media for interaction with friends and family and uses e-commerce applications for online purchases from groceries to electronics. Keeping this trend and statistics in mind it is essential for the pharma companies to project the right information about company, brand, product, and services and make it online at the right platform where the target customer is most likely to hunt for the required information. To reach the target audience across the globe through social media is not an expensive or herculean task. What is required for a medium sized pharma company is a right digital strategy and to become successful company should direct its energies in digital direction.

j. Challenges and recommendations for Implementation of Digital Strategy:

Some of the non-technical challenges the organizations could face while designing, adopting and implementing the digital strategies are listed below:

i) Cost Implications: The major challenge for medium size pharmaceutical companies in implementing digital strategy is the cost factor. Huge amount of money need to be spent on digitalization process and the leadership is skeptical about returns on the investment in technology. As per the findings huge market which is yet to be tapped and there is always chance for medium sized companies to use the opportunities in global markets if the companies invest in digitalization process to compete with the large companies.

ii) Managing organizational change: The digital process involves the latest technologies and human resources to play vital role in implementing the strategy. Adopting and implementing is a hectic task but more hectic is to keep on improvising the things as per market trends and needs. The employees should be trained and equipped properly to handle the new technologies. Managing the transformation from conventional way to digital way demands an attitudinal change across organization. The research findings establish that employees invite technology if it is going to benefit the firm in the long term.

iii) Top management involvement: The digitalization is possible only if the management team drives it. The technology implementation, constant updating and monitoring is essential to keep the organization growing. Management needs to challenge the way traditional managers execute the things based on their personal experiences. Management should bring a change management atmosphere by bringing the new talent which becomes a catalyst for the change. Research findings establishes the above statement.

iv) **Lack of knowledge and Planning:** In this research, the views of few professionals' states that there is a knowledge gap in defining the organizational requirements in line with goals and objectives while designing a digital strategy. The digital strategy is a step by step process which needs to be carried by expert team as per scheduled plan. If the design is wrong or the implementation is not proper the organization will end up in incurring losses. Research findings suggest that the management needs to hire technically competent team to manage the transformation.

5.3 Conclusion

The objective of this research was to understand whether digital strategy is required for a medium sized pharma companies to become successful in highly competitive, complex global markets. It is evident from both primary and secondary research, that digitalization and automation plays a very important role for medium sized pharma companies to expand their business to global markets. The research carried out in practical environment by interviewing different level professionals, leadership teams and few directors as well. There was a mixed and difference of opinion in few cases but at large the majority opinion is in support of implementation of digital tools for a futuristic organization. Researcher has reviewed various articles from journals, statistical data, surveys and personal interaction with industry leaders and academicians on pros and cons, best practices and challenges involved in the digitalization process.

The primary research is carried out in two phases. The outcomes of Phase - I study clearly establishes that across different demographic verticals the respondents are in favor of digitalization in different domains. The research also reveals that medium sized pharma companies can implement digital platforms for long term benefits. Pharma companies need to embrace technology oriented solutions in their strategic planning. The research also suggests in favor of making digitalization an integral part of the corporate strategy for success.

The Phase - II primary research focused on unearthing the different motives of the companies to adopt digital strategy for attaining competitive advantage. Knowing the fact that the motives of small, medium and large companies can be different, the research findings were according to the size of the companies.

Small firms intending to use digital strategies to competitive advantage through speed in data management, Medium sized firms primarily want to use digital strategies for increasing manufacturing output and benchmark their product quality and regulatory compliance in line with global standards. Large scale company’s motives are at a different level as they want to use digital tools for market penetration and creating brand equity for their company and brands.

Research also revealed that while small scale companies are at a primary stage and are not capable of adopting digital strategies, Medium scale firms are keen to adopt the digital applications across various functional domains and make it a corporate strategy. However it was found that large scale pharma companies have already adopted digitalization and wants to improve on effectively implementing the digital process.

The overall outcome of the research establishes that the adoption of digital tools will bring optimization of processes, reduce waste and improve yield in production to become competitive. By proper scheduling in SCM improves the delivery timelines. To develop differentiated products, first to launch products with the help of analytical tools by research and development team, the adoption of newer technologies is critical. Business analytics will help the management to take informed decisions on product selection, competition mapping, pricing strategy and entry plans. Digital marketing and social media will help in brand positioning, brand building by reaching out customers across globe in marketing.

Research findings clearly establish that many of the large Indian pharma companies have grown over the last three decades from humble beginning by adoption of market oriented strategies. Utilization of digital tools across the various functions helped them move to large category. It was further found in the current study that Medium and large size companies are very keen on adopting newer technologies and they are focus is on implementation of the strategies effectively.

In the connected world, Digital collaboration today stretches beyond the borders of the organization, with communities' co-creating products or services, and customers providing opinions and suggestions for product improvements through various online forums.

In the era driven by technology, no business can become successful and sustainable without implementing latest digital technologies. Hence the integrated digital strategy is need of the hour for a medium sized Indian pharma companies to sustain in domestic market and to successfully capture global markets with all the complexity that it offers.

5.4 Limitations and Scope for Further Research

Current research work focused primarily on the need of digital tools for Indian pharmaceutical companies competing in the highly competitive global market. Pharma industry is a protective industry because of its intrinsic characteristics like patents, product technologies, product dossiers, clinical trials and business secrets. In this scenario sharing the information outside the company is perceived as conflict of interest whether it is academic or nonprofit. In spite of researcher's domain experience and contacts, many executives were not in favor of sharing any information. Good amount of resources spent to interact with the prospective participants to convince them to be a part of this study and then finalized the first list of participants. After finalizing the first list, many of the agreed participants dropped out from the study. Considering the above challenges lot of time was spent for preparing the questionnaire which doesn't conflict the participant work, pilot testing of the questionnaire, delivering the questionnaire and receiving of the questionnaire.

Study was aimed to explore and identify some of the genuine problem areas facing by many Indian pharma companies after a thorough secondary research and researcher's own experience. Researcher was able to study and evaluate broadly the need of digital tools in different verticals from R&D, manufacturing, supply chain, quality assurance, marketing etc. Due to lack of resources and guidance in this area, researcher could not do in-depth study.

World is moving towards adopting to digital technologies in all aspects of business and life. Hence there is a lot of scope for further research to conduct in-depth study of adaptation of digital strategy as a whole for a pharma company. Also benefits of using digital tools in various functions of pharma industry can be studied considering the future trends. There is further scope to study the challenges in implementing the digitalization process in each and every function of a Pharma Company and also centralized digital strategy and development of digital strategy framework for pharmaceutical industry.

Research is a never ending process and even a small research brings in lots of value addition to the human life. Mankind is still surviving against all odds and progressing due to the innovation. Let's continue our efforts in research to add value to human life.

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APPENDIX - A

QUESTIONNAIRE USED FOR DATA COLLECTION

Dear Professional Friend,

Objective of this exploratory research is to study whether digital strategy can be exploited to globalize Indian pharma companies particularly the medium size companies that may have resource constraints to go global using the new medium as a competitive tool. How can these companies move into the new development wave to exploit global markets cost effectively using new technologies? The use of new technology is important in the process of seeking and development of new markets.

The objective of this questionnaire is to study and understand whether the technological transformation is required for Medium sized Indian pharma companies to enter and sustain in Global markets.

About the Research Scholar & Author: Jayapala Reddy A V, M. Pharma, PGDM has 17+ years' experience in Pharmaceutical Industry specialized in International business. Currently he is working with Mylan (3rd largest Generic Company in the world) as Head of Asian business. Prior to joining Mylan, he has worked with Top Indian Pharmaceutical companies like Dr. Reddy's Labs, Aurobindo Pharma & Strides Arcolab. He was instrumental in opening up key geographies/ countries for Dr. Reddy's &Aurobindo Pharma from almost scratch. He travelled extensively in GCC, MENA, Asia, Russia & CIS region.

He is pursuing Ph.D (International Business) from Vignan University, Guntur, Andhra Pradesh, India under the Guidance of Prof. B. Madhusudhan Rao, PhD, HOD - School of Management Studies, Vignan University. The above questioner is purely for the academic research purpose.

If you would like to hear more about the research work, please communicate on jayapala@gmail.com or +91-9701058160 or connect on Linkedin:http://in.linkedin.com/in/jayapalareddy

Hope you will have an interactive, knowledgeable and enjoyable session.

Many thanks in advance!

Cheers

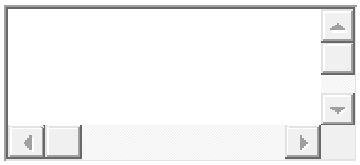
Jayapala Reddy A V

NB - Instructions for entering data. There are 3 types of questioners to be filled as instructed below. After you complete filling the data, please click on SUBMIT button to send your response.

1. Plain Box - Just enter the text
2. Multiple choice - You can click on only one choice (Round shape)
3. Click Box - For click boxes you can click on the multiple boxes (Box shape)

Digital Strategy in the Globalization of Medium Sized Indian Pharmaceutical Companies

Digital Strateg Form Title



1. Name

2. Company Name & Address

3. e-mail

4. Mobile

5. Your designation in the company

- Manager Cadre
- General Manager Cadre
- Vice President Cadre
- Promoter/ Management/ Board

6. Educational Background

- Degree
- Masters Degree & Above

7. Age group

- 30-40
- 40-50
- 50 & above

8. Type of your company

- Public listed company

- ○ Privately held company
- ○ Proprietorship company
- ○ Partnership company

9. Experience Level in Pharma Industry

- ○ 5-10 years
- ○ 10-15 years
- ○ 15-20 years
- ○ 20 years & above

10. Your company involve in

- ☐ R&D
- ☐ Manufacturing
- ☐ Marketing
- ☐ Distribution
- ☐ All of the above

11. Your Company Size

- ○ Small (Below 100 crores/ annum)
- ○ Medium (100 to 500 crores/ annum)
- ○ Large (500 crores & above/ annum)

13. Your functional domain

- ○ R&D
- ○ Manufacturing
- ○ Sales, Marketing & BD
- ○ Technocommercial
- ○ Supply Chain Management

14. Does your company operate in global markets

- ○ Yes
- ○ No

15. Employee base of your company

- ○ Below 100
- ○ 100-500
- ○ 500-1000
- ○ 1000-10000
- ○ 10000 & above

16. How globalization does helps Indian pharmaceutical companies in Global markets?

- ☐ Helps in building a global brand which adds value to the organization in long run
- ☐ Enjoy export benefits offered by Indian government
- ☐ It helps organizations to adopt glocal structure
- ☐ Contributes to Indian economy & sector growth helps in generating employment
- ☐ Leveraging technically skilled low cost manpower to compete with global companies
- ☐ All of the above

17. Why do you think that the global pharmaceutical market will grow further?

- ☐ Increase in prevalence of chronic diseases because of change in lifestyle
- ☐ Increase in global spending on medicines & health care
- ☐ Expanding access through health coverage and cost containment
- ☐ Increase in average life expectancy through advanced diagnosis and lifelong medication
- ☐ All of the above

18. What are the opportunities for Medium sized Indian pharmaceutical companies in Global markets?

- ☐ Leveraging on India's low cost manufacturing to compete in the global markets
- ☐ Strategic partnerships with regional companies for R&D of generics
- ☐ Semi-regulated markets to give quick entry to leverage the existing portfolio
- ☐ Collaborate and capitalize on new science
- ☐ All of the above

19. Why do you think that digital strategy is important to compete in the global markets?

- ☐ To compete with the global and regional companies
- ☐ Helps the Organization to be highly efficient, productive, responsive & competitive
- ☐ It helps organization to become Intuitive enterprise
- ☐ Through border-less marketing companies can project strong brand culture clearly across the touch points & channels
- ☐ Flexibility to operate at global and local level & Making product more popular at global markets
- ☐ All of the above

20. How cloud technology helps pharmaceutical companies to become a serious player in global markets?

- ☐ Time to Market and effective Data Management
- ☐ Cost Containment; Faster and better informed decisions
- ☐ Reduces Operating cost; Increase in Sales, Productivity, R & D and Profitability
- ☐ Direct customer interaction for feed back which will help in enhancing or upgrading the product.
- ☐ All of the above

21. How would the role of CIO (Chief Information Officer) evolve for companies with strong focus on using digital strategies/ options?

- ☐ Driving digital transformation from top
- ☐ Putting Digital strategy in pace with ambition
- ☐ Placing Digital and Technology at the core of the business
- ☐ Forming partnerships with other technologies and counterparts
- ☐ All of the above

22. Why do you think latest market research software tools required to be successful in global markets?

- ☐ Helps in creating a potential product portfolio by analyzing the market trends
- ☐ We can get accurate qualitative and quantitative data to determine the target market
- ☐ It helps in aligning research effort and capabilities with market growth potential
- ☐ It helps to keep focus on customers, Business and revenue growth
- ☐ All of the above

23. Is digital marketing a must for pharmaceutical companies?

- ○ Yes
- ○ No
- ○ Can't say

24. How can companies ensure that they are reaching their target audience through their digital strategies?

- ☐ Getting statistical and analytical data of past responses, clicks and feed backs
- ☐ Taking the help of SEO techniques (Search Engine Optimization), Google ad words etc
- ☐ By checking the data using ad safe, double verify tools etc
- ☐ Diagnosing by using software's like Comscore's campaign etc software's
- ☐ All of the above

25. How Social Media can be effectively used to build the brand in global markets?

- ☐ Find Content which will resonate deeply with the targeted audience

- Know where your customers spend their time
- Positioning the brand, post quality videos, Promotions etc.
- Identifying and participating in right groups in Face Book, Twitter, LinkedIn etc.,
- All of the above

26. How automation is going to help in increasing regulatory compliance of various regulatory bodies?

- Complying with the guidelines of various global regulatory bodies
- Time saving for CIOs, Compliance officers and cost saving for organizations
- Helps in growth of the business as the compliance are strictly monitored and followed.
- Helps in decision making with accurate data
- Helps in controlling the non compliance at levels
- All of the above

27. How automated equipment and IT systems in manufacturing of Pharma products helps to meet the market demand?

- Minimize human intervention thereby minimizing the errors and maximizing the quality
- Increases the production output to meet the market demand
- Real time data management to comply with the regulatory requirements
- Online regulatory filings saves lot of resources there by faster approvals and early entry to market
- All of the above

28. How does new software tools helps in designing marketing strategies to service healthcare providers and expanding to new territories to increase the revenues?

- The traditional paths to reaching healthcare providers, payors, and patients are changing, as they rely on new avenues to make their prescription decisions trusting new influencers and turning to emerging digital sources to fuel their choices.
- To add efficiency to their sales force and help keep up with changing demands, pharmaceutical companies have turned to technology, including Customer Relationship Management, Closed Loop Marketing and Sales force Automation
- Tighter physician schedules mean it's more difficult for pharmaceutical reps to achieve face-to-face time with doctors. New channels need to be examined for pharmaceutical companies to get their message across
- Marketing automation can help meet these new needs, helping marketers keep up with the new multi-channel and multi-influencer environment all while increasing their digital effectiveness

- All of the above

29. What is the significance of using latest technology in the manufacturing of pharmaceutical products in current business perspective?

- To meet the compliance and regulations without any deviations
- It reduces time to market and increases first to launch opportunities to gain the maximum market share
- Proper controls, well defined processes assures the high quality products
- Implementation, monitoring and feedback mechanisms can be achieved
- All of the above

30. How are latest tools like SAP/ ERP going to help in overall supply chain management?

- Real time Purchase order processing and on time deliveries
- Proper management of Inventory and sourcing
- To meet the good warehouse practices as per the regulatory requirements
- Real time status on the movement of the consignments globally
- All of the above

31. What is the role of automation and new technological tools that helps to identify, conceptualize, and develop the product in R&D?

- Study and Evaluation of Technological Innovations to compete in the market
- Helps in Development of New Products through In-House R&D to meet the unmet need
- Better understanding of Patents and Intellectual Property Rights
- All the above

32. Why many Medium sized Indian pharmaceutical companies could not become successful in Global markets in spite of good market growth & potential?

- Failure to obtain export counseling and to develop a master international marketing plan before starting an export business
- Not committed to adopt the technological changes in Manufacturing, Regulatory affairs & Marketing
- Lack of resources and right portfolio to compete in the market
- Not partnering with strong local partner or distributor
- All of the above

33. What is the role of e-commerce in the era of globalization?

- It helps in evolution of Company and the readiness for exports
- Helps in reaching the clients/ customers globally with less resources

- ☐ Increases the visibility there by enhancing the brand image and sales
- ☐ Right medium for showcasing the capabilities/ strengths and communicating the vision of the company
- ☐ All of the above

34. Where does the medium sized company stand in investing in R&D bearing the fact that larger companies are well ahead in the game of R&D due to the fact that they are highly resourceful?

- ☐ Lack of financial & technical resources to develop new products to meet the market demand
- ☐ They can still be in the game if they go for strategic partnership with highly focused business/ products with global companies
- ☐ To leverage on the available resources and take a calculative risk to expand in to R&D
- ☐ Failing in understanding that they will have long term gains
- ☐ All of the above

35. What would be your advice to the medium sized pharmaceutical companies planning to enter the highly competitive and dynamic global market?

- ☐ Get the best Management team and develop long term business plan
- ☐ Right product and market mix
- ☐ Strategic Marketing Plan coupled with Brand Promotion
- ☐ Digitalizing end to end services
- ☐ All of the above

36. What changes you would expect if an organization goes digital?

- ☐ International standards in terms of Operations, Human Resources etc.
- ☐ Changes the phase and pace of the business and the mode of operations.
- ☐ It helps in up gradation of technology and exchange of technology.
- ☐ It helps to have a competitive edge advantage in Marketing and increasing bottom line.
- ☐ All of the above

37. Do you think that Medium sized pharmaceutical company is capable of implementing cost intensive digital platforms?

- ○ Yes
- ○ No

- Can't Say

38. How the organization's digital strategy will impact the outlook of human resource?

- Migration from people to process run organization
- Increases accountability and ownership there by increasing the output
- Helps in connecting, communicating and collaborating across the Organization
- Defines Roles and responsibilities of all employees
- All of the above

39. Do you think that Pharmaceutical companies will only succeed if they embrace the technology and incorporate it in their wider strategic planning?

- Yes
- No
- Can't Say

40. Do you agree that going digital is the need of an hour as well as future and it should be considered as a corporate strategy?

- Yes
- No
- Can't Say

41. How can digital strategy a successful tool in long term?

- To build a successful and profitable global organization
- To increase the revenues from Global markets
- Helps in developing new products and building a strong manufacturing base
- All of the above

Add item

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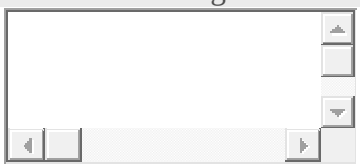

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LIST OF PUBLISHED ARTICLES AND CONFERENCES PARTICIPATED

Below are the list of articles published in various journals and based on research review topic, researcher was invited as a speaker in a leading pharma conferences to deliver a talk.

1. **Research article** - Jayapala Reddy A. V, Dr. B. Madhusudhan Rao, "Opportunities and challenges for Indian Pharmaceutical companies in overseas markets and need of digital tools for sustainable success", Journal of Pharmaceutical Education & Research. Vol 51. Issue 2. Apr-Jun, 2017.
   Journal details: Journal of Pharmaceutical Education & Research – Indexed and abstracted in SCI & SCOPUS (ISSN – 0019-5464)
2. **Research Article** - Jayapala Reddy A. V, Dr. B. Madhusudhan Rao, "Business model based pricing strategies for pharma products in Southeast Asia region", Journal of Pharmaceutical Research. Vol.15. No.4, Oct - Dec 2016: 116.
   Journal details: Journal of Pharmaceutical Research (Print - ISSN - 0973-7200 & Online-ISSN-2454-8405)
3. **Review Article**- Jayapala Reddy A. V, Dr. B. Madhusudhan Rao, "Review of Hyderabad pharmaceutical industry: An emerging global pharma hub", Elixir Marketing Mgmt. 76 (2014) 28362-28366. *Journal details* – Elixir International Journal – Marketing Management (ISSN: 2229-712X)
4. **Research Article** - Jayapala Reddy A. V, Dr. B. Madhusudhan Rao, "Opportunities for Indian pharmaceutical companies in the era of globalization", Journal of Global Trends in Pharmaceutical Sciences, Volume- 5, Issue -2, pp – 1567-1575 - April –June (2014)
   Journal details - Journal of Global Trends in Pharmaceutical Sciences (ISSN: 2230-7346)
5. **Conference participation as a Speaker at 68th Indian Pharmaceutical Congress**
   Delivered a talk on "Pharmaceutical industry in Hyderabad & its contribution to IPR" at 68th IPC held at Vizag, AP, India. IPC is the largest pharmaceutical conference in India with more than 10,000 delegates across the world from Academia, Industry, Government and Policy makers.
6. **Conference participation as a Key Note Speaker at NIPER, Hyderabad**
   Delivered a talk on" Evolution of Hyderabad Pharmaceutical industry" at NIPER - PHARMA INDUSTRY SUMMIT – Role of Academia in Strengthening of Indian Pharma (NIPER – National Institute of Pharmaceutical Education and Research)

JAYAPALA REDDY A V – PROFILE

Jayapala Reddy A V is currently an Associate Vice-President and Global Head - Biologics Business at Hetero Biopharma Limited (Hetero group company - One of the Top 10 pharmaceutical company in India). Jayapala has completed Master in Pharmacy from Bangalore University in 1997 and Post-Graduate Diploma (Part-time) in Management Studies from Edexcel, United Kingdom in 2008. Currently he is also pursuing PhD (Part-time) in International Business with a research focused on digital strategies for pharma companies. He has around 20 years of diverse experience in pharma industry with 18 years in international business and has travelled extensively over 50 countries across the globe. His area of expertise include - strategy, business development, sales, marketing, regulatory and clinical affairs with many accomplishments and contribution to Indian pharmaceutical industry in global markets. He was instrumental in setting up businesss operations from scratch and successfully managed various business models across all geographies. Jayapala has also handled other functions in pharma industry like quality assurance, retail business and distribution of pharmaceuticals.

Having lived around 10 years in Gulf region and Canada, Jayapala returned back to India to be an integral part of Indian pharma industry in the global markets. In his previous assignments, he held key positions with leading Indian and global pharmaceutical companies like Dr. Reddy's Laboratories Ltd., Aurobindo Pharma Ltd., Strides Arcolab and Mylan Inc. He has published articles in leading journals, participated in global conferences as delegate, exhibitor and speaker. Jayapala has underwent trainings and workshops in the areas of leadership, change management, crisis management, decision making, strategic collaboration, international trade etc. He is a strong believer of continuous learning and inspires the youth through his interactive talks on various platforms.